Journal of the
Indian Medical Association

VOL. XV, No. 8 CALCUTTA MAY, 1946

OBSERVATIONS ON THE KEEPING PROPERTIES OF ADRENALINE-PROCAINE SOLUTIONS AND TABLETS

B. N. CHOWDHURI, M.B.,
B. B. ROY, M.B.*
AND
D. P. GHOSH, B.SC., M.B.,
Bio-Chemical Standardisation Laboratory, Government of India, Calcutta

INTRODUCTION

In previous publications from this laboratory (Mukerji and Dutta, 1942; Bose, Dutta and Mukerji, 1942; Chowdhuri and Mukerji, 1946), it has been shown that liquid preparations of Adrenaline, *viz.*, Liquor Adrenalinæ Hydrochloridi, Liquor Adrenalinæ Tartratis, etc., are fairly unstable, particularly under the storage conditions ordinarily available in India. In view of this, it was recommended that liquid preparations of adrenaline manufactured and marketed in India should preferably be maintained at a definite *p*H range and should also contain a suitable stabilizer. It was further recommended that such preparations should be *dated* (not to exceed one year from the date of manufacture) so as to preclude the use of time-expired and under-strength preparations. In the present paper, a similar study regarding the keeping properties of combined adrenaline-procaine solutions and tablets has been completed. These findings are being separately presented, as they tend to confirm and extend previous observations pertaining to the tendency for comparatively rapid deterioration of adrenaline solutions available for use in this country.

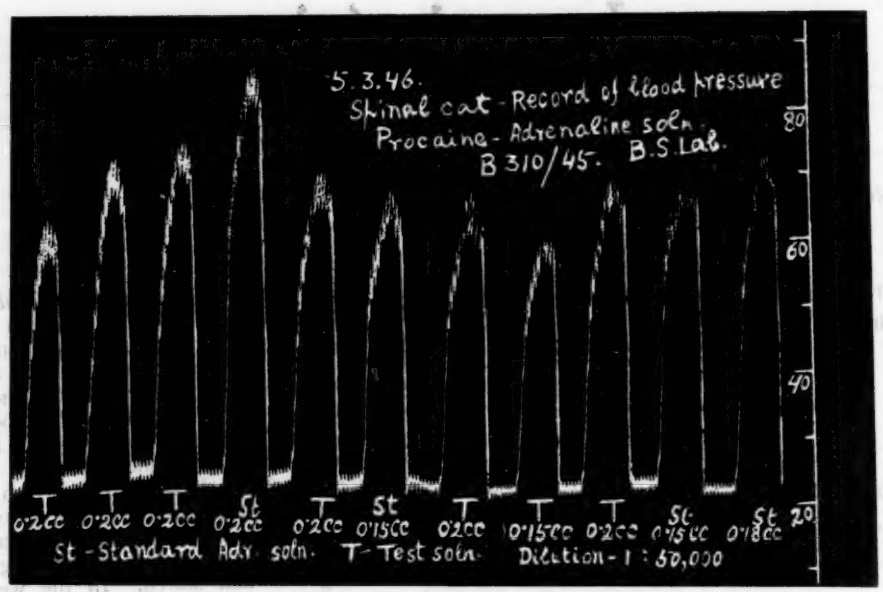
Solutions of procaine hydrochloride is extensively used for the purpose of infiltration, regional and splanchnic anæsthesia and analgesia. Partly because the natural alkaloid cocaine is not easily available and partly because procaine is less toxic and better tolerated by the tissues, procaine has replaced cocaine in almost all its field of application, excepting perhaps in eye work, where local absorption and insensitisation of conjunctiva by instilation of cocaine is needed. Procaine, however, has the disadvantage that its action is very transient, unless adrenaline is added to it. The combination of adrenaline with procaine hydrochloride has therefore been made *official* in the 4th Addendum to the British Pharmacopœia (1941) under the title of "Injectio Procainæ et Adrenalinæ (procaine hydrochloride 2 per cent, adrenaline 1 in 50,000). In the 6th Addendum to the B.P. (1943), the title of the monograph on procaine-adrenaline has been changed to "Injectio Procainæ et Adrenalinæ Fortis" and another new preparation under the title of "Injectio Procainæ et Adrenalinæ Mitis", which is ¼ the strength of the former (procaine hydrochloride 0·5 per cent and adrenaline 1 in 500,000), has been added. In the strong ('fortis') solution, all the ingredients are mixed together and stored. In the weak solution, however, it is recommended that it should be prepared *immediately before use* by mixing the sterile solution of procaine hydrochloride (2 per cent) with 3 times its volume of physiological solution of sodium chloride and of adrenaline hydrochloride in the proportion of two millilitres to each 1000 millilitres of the injection.

EXPERIMENTAL

In the course of routine analysis of samples from various official channels, we had the opportunity of testing 40 samples of procaine-adrenaline, both in tablet and in liquid form. Excepting in two brands of British make (consisting of 25 samples), the date of manufacture was not found mentioned on the label of these preparations. The strength of all the preparations was found to be identical to the 'fortis' solution of the B.P. (Injectio Procainæ et Adrenalinæ Fortis). The presence or otherwise of any stabilizer to prevent quick deterioration of adrenaline is not mentioned in most cases. In a few instances, a stabilizer of the type of thymol or capryl-hydrocupreinotoxin was stated to have been added. These samples were all tested for their procaine content according to the directions given in the B.P. and were also tested for their adrenaline potency by the pressor method on pithed cats according to the procedure recommended by Woolfe (1941*a*), care being taken to avoid any fallacy in the readings due to the possible potentiation of adrenaline effect resulting from the simultaneous presence of procaine in the solution (Munch & Deckert, 1930).

The results obtained are shown in Table I. A typical kymographic tracing (Graph 1) showing the sequence of injections adopted in equating the potency of the unknown with that of the standard adrenaline solution of the same strength is also given to indicate the actual technique adopted before any conclusion is drawn.

* Of the Department of Pharmacology, Carmichael Medical College; on deputation at the Bio-Chemical Standardisation Laboratory.


5.3.46.
Spinal cat - Record of blood pressure
Procaine - Adrenaline soln.
B 310/45. B.S.Lab.
80
60
40
20
T T T St T St T T T St St
0·2cc 0·2cc 0·2cc 0·2cc 0·2cc 0·15cc 0·2cc 0·15cc 0·2cc 0·15cc 0·18cc
St - Standard Adr. soln. T - Test soln. Dilution - 1 : 50,000

GRAPH 1—SHOWING STANDARDISATION OF A PROCAINE-ADRENALINE PREPARATION. Three doses (0·2 c.c. each) of the test solution (procaine-adrenaline) were given in succession at 7 minutes' interval in order to obtain the potentiation of the pressor effect of adrenaline by procaine which reaches its maximum in about 8 minutes and persists for about an hour. (It is assumed that after these initial doses the potentiation of the pressure effect is equal on the adrenaline in the standard solution and in the test solution and that the potentiation remains constant as injections of solution containing procaine are given every few minutes). The potency of the test solution was then determined by the usual procedure adopted for solution of adrenaline only.

DISCUSSION

The data incorporated in the Table are self-explanatory. Practically the samples tested were found to contain procaine in accordance with the strength claimed on the label. The adrenaline content, however, was usually considerably below the claim in all but 6 samples. Of these 6 samples, 3 were stated to have been manufactured within one month of testing; in the remaining 3 samples, the date of manufacture was not mentioned. In case of other samples, where storage period has varied from 4 months to 34 months, the rate of deterioration is found roughly proportional to the period of storage. This is in line with previous observations from this laboratory (Chowdhuri and Mukerji, 1946). The degree of deterioration of adrenaline is however much greater when it is in combination with procaine than when adrenaline alone was present (Graph 2). It seems clear therefore that the presence of procaine accelarates the deterioration of adrenaline, even a 5 months' storage producing 40 per cent deterioration in adrenaline content in contrast to only 2 to 3 per cent deterioration over the same period of storage in case of simple adrenaline solutions without procaine.

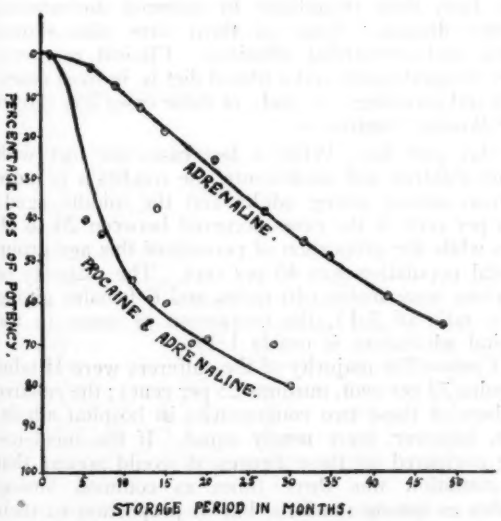
These observations in India appear to corroborate the findings of Woolfe (1941*b*), who has shown that the activity of adrenaline in combination with procaine hydrochloride is only 55 per cent after a storage of 35 days when it is exposed to light and 75 per cent when it is kept in dark. When chlorocresol and/or chlorobutol and sodium metabisulphite are used as stabilizers (as in the B.P. preparation of strong solution), this deterioration is considerably delayed—an activity of 70 per cent being retained after storage for 69 days. This is in accordance with our findings recorded in the first five preparations in Table I, which are identical with the B.P. strong ('Fortis') preparation (containing chlorocresol as stabilizer), no deterioration being observed after 1 month's storage and only 43 per cent deterioration in a period of about 7 months storage. In other samples, no definite mention has been made as to whether any stabilizer has been used or not. From the rather rapid falling off of potency in these preparations, it appears reasonable to assume that stabilisers were not present.

SUMMARY AND CONCLUSIONS

Forty preparations of combined 'Procaine-Adrenaline' of foreign make have been analysed for their respective procaine and adrenaline contents, using 'standard' and well-accepted methods in both cases. In all samples the procaine content has been found to be up to claim, whereas the adrenaline content has been found to have invariably fallen off. This deterioration appears to be more marked when adrenaline is present in combination with procaine than when adrenaline is present alone. The presence of a stabiliser reduces the chances of deterioration only to

TABLE 1—SHOWING PERCENTAGE LOSS OF ADRENALINE POTENCY IN PROCAINE-ADRENALINE PREPARATIONS

Sample No.	*Physical Character*	*Period of storage (Months)*	*Procaine content*	*Percentage loss of Adrenaline potency*
1	Clear, colourless sol.	1	2·0%	0
2	do	1	do	0
3	do	1	do	0
4	do	5	do	40·0
5	do	7	do	43·0
6	do	not stated	do	6·3
7	do	do	do	6·3
8	do	do	do	21·1
9	White Tablets	11	0·02 gm. per tab.	54·6
10	do	11	do	above 80·0
11	do	13	do	59·0
12	Brown Tablets	14	do	37·5
13	Whitish Tablets	15	0·0205 gm. per tab.	60·0
14	Brownish Tablets	16	do	80·0
15	Brownish Tablets	18	do	80·0
16	White Tablets	18	do	60·0
17	do	18	do	72·0
18	do	20	do	69·0
19	Brownish Tablets	22	do	above 80·0
20	do	22	do	do
21	do	25	0·0198 gm. per tab.	do
22	do	27	do	do
23	do	28	do	70·0
24	do	30	do	80·0
25	do	31	do	above 80·0
26	do	32	do	do
27	do	33	do	do
28	do	34	do	do
29	White Tablets	not stated	do	do
30	do.	do	0·0205 gm. per tab.	above 80·0
31	do	do	do	do
32	Brownish Tablets	do	do	80·0
33	Clear, colourless sol.	do	2·05%	55·6
34	do	do	2·05%	50·0
35	Brownish Tablets	do	0·0198 gm. per tab.	above 80·0
36	do	do	do	80·0
37	do	do	do	32·0
38	Whitish Tablets	do	do	50·0
39	do	do	do	50·0
40	do	do	do	60·0



GRAPH 2—Comparative curves—showing degree of deterioration on storage of simple adrenaline solutions and procaine-adrenaline preparation.

a certain extent, but cannot do so completely. There has been no significant difference in the rate of deterioration between solutions and tablets.

The findings leave little room for doubt that a combination, either in tablet or in liquid form, of procaine with adrenaline is not a desirable pharmaceutical formula. The adrenaline in such a formula is liable to undergo a rapid deterioration on keeping even when it is present in 'tablet' form. The use of the 'Injectio Procaine et Adrenalinæ Fortis' of the B.P. Addendum should therefore be discouraged particularly in the tropics where exposure to strong light cannot be easily avoided. The only way through which a desirable combination between procaine and adrenaline can be achieved for surgical purposes is through the new preparation of "Injectio Procaine et Adrenalinæ Mitis" introduced in the 6th Addendum to the B.P. Here it is insisted that the adrenaline solution should be mixed with procaine *immediately before use*. We have prepared this solution in the laboratory and find that it is satisfactory for all purposes.

ACKNOWLEDGMENT

The authors wish to thank Dr. B. Mukerji, Director of the Laboratory, for his suggestion of the

(*Continued at foot of col. 1, page 268*)

SOME OBSERVATIONS ON CASES OF ASCITES IN HYDERABAD-DECCAN*

V. GOPAL RAO, M.B.B.S. (OSMANIA),
From the Pharmacology Department, Osmania Medical College, and Osmania Hospital, Hyderabad-Deccan

I. ASCITES ASSOCIATED WITH NUTRITIONAL DEFICIENCY

INTRODUCTION

In a previous communication (Hardikar and Gopal Rao, 1943) it was pointed out that ascites was a fairly common condition in Hyderabad; that while a large proportion of cases were associated with cirrhosis of the liver, there was a considerable percentage in which the occurrence was attributable to defective diet. These cases were found to be capable of recovery under a regime of liberal diet. Since then 343 consecutive cases of ascites from all causes have been studied by the writer under the guidance and direction of Dr. S. W. Hardikar, M.D., M.R.C.P. (EDIN.), Professor of Pharmacology and honorary physician, Osmania Hospital to whose care the cases were referred by the members of the hospital staff. It is considered that an analysis of the findings and the inferences derived from them might prove helpful in gaining further insight into the problem of ascites and cirrhosis of the liver in this part of India.

DIAGNOSIS OF ASCITES

Ordinarily the recognition of the presence of free fluid in the peritoneal cavity does not present much difficulty and can be easily ascertained by clinical examination. In some instances, however, cases of abdominal distension from other causes are put down as ascites. In 12 such instances there was no recognizable amount of free fluid in the peritoneal cavity, the condition on subsequent examination in the investigation ward were as follows:—

Ovarian cyst	5 cases
Cystic kidney	2 cases
Pregnancy	1 case
Enteric fever with abdominal distension	1 case
Elephantiasis of vulva with thickened abdominal wall	1 case
Diabetes mellitus	2 cases

In the last condition the thin, wasted abdominal parieties giving to the palpating hand a feeling of 'bag of water' in which the intestines were floating as it were, were perhaps responsible for a mistaken diagnosis in the first instance. In any case a careful physical examination indicates the presence or otherwise of ascites, and in women a routine internal examination is always helpful.

DIFFERENTIAL DIAGNOSIS OF THE CAUSE OF ASCITES

The differential diagnosis of the causes of ascites is not always easy even after a careful study of case-history and a thorough clinical examination supplemented by other acids. Table I shows the associated conditions in 343 cases of ascites and the results of treatment. It will be seen that cirrhosis of the liver ranks first, accounting for 37 per cent of all cases; 'Nutritional Ascites' accounts for 15·1 per cent; cardiac insufficiency (15·1 per cent), renal diseases (11·3 per cent), tuberculosis (pulmonary 6·1 per cent, peritoneal 4·0 per cent), and malignant deposits in the abdomen and pelvis (6·4 per cent) are next important conditions.

In this paper observations on cases of ascites associated with 'nutritional deficiency' and cirrhosis of the liver are presented and discussed in part I and II respectively. Observations on cases of ascites associated with other conditions stated in Table I are not presented. Suffice it to say that in the latter the study, for purpose of differential diagnosis, included besides history-taking and physical examination, an examination of fresh specimen of urine in all cases and that of blood (hæmatological and biochemical), fæces and sputum whenever indicated. Radiological examination of the chest and electro-cardiography were done as additional aids. The results of examination of ascitic fluid are shown in Table VI from which it will be seen that a routine examination of the fluid particularly for cellular content, is helpful in diagnosis of certain conditions, notably malignancy and tuberculosis. In case of women it was a routine practice to look for the presence of any pelvic disease and have them examined by a gynæcologist to confirm the presence or otherwise of the same.

NUTRITIONAL ASCITES

Fifty-two cases of ascites out of a total of 343 (15·1 per cent) have been classed as due to nutritional deficiency without any recognizable organic disease. Clinically they are characterised by the presence of ascites as the main condition, usually associated with œdema of the lower extremeties and trunk and in some cases face, thus resembling in external appearance, Bright's disease. Some of them have also shown pleural and pericardial effusions. Clinical recovery, under hospitalisation and a liberal diet is, in most cases, rapid and complete. A study of these cases has shown the following features:—

Age and Sex—While a few cases are met with among children and adolescents, the condition is more common among young adults and the middle aged; 55·6 per cent of the cases occurred between 20 to 50 years while the proportion of persons of this age group to total population was 40 per cent. The majority of the cases were males (46 males and 6 females giving a sex ratio of 7:1), the proportion of sexes in the hospital admissions is nearly 1:1).

Caste—The majority of the sufferers were Hindus (Hindus 73 per cent, muslims 25 per cent); the relative numbers of these two communities in hospital admissions, however, were nearly equal. If the incidence were compared on these figures, it would appear that the condition was three times as common among Hindus as among muslims, but in proportion to their relative numbers in the state population (Hindus 84·3 per cent, muslims 11·3 per cent), there seems to be no selective affection.

* The paper which is abridged from the original is based on work done with the aid of special grants from the Osmania University and the Indian Research Fund Association. It was presented before a meeting of Medical and Veterinary Section of the 32nd annual session of the Indian Science Congress held at Nagpur in the first week of January 1945.

TABLE 1—SHOWING THE CONDITIONS ASSOCIATED WITH ASCITES IN 343 CASES (MALES 252, FEMALES 91) AND THE RESULTS OF TREATMENT

Serial Number	Diseases	Number of cases	No. of cases Recovered	No. of cases Improved	No. of cases Discharged Otherwise	No. of cases Died	Remarks
1.	Cirrhosis of the liver—						Recovery in nutritional ascites cases indicates complete disappearance of ascites without requiring paracentesis except in rare instances, followed by gain in real weight and improvement in general condition. Recovery in other cases indicates freedom from ascites and oedema at the time of discharge and considerable improvement in general condition.
	(a) Portal cirrhosis 108						
	(b) Biliary cirrhosis 7						
	(c) Infantile biliary cirrhosis .. 6	127(37%)	3(1·5%)	12(9%)	74(59%)	38(29·9%)	
	(d) Syphilitic .. 6						
2.	Nutritional deficiency ..	52(15·1%)	32(1·5%)	10(19·2%)	3(5·7%)	7(13·4%)	
3.	Cardiac insufficiency ..	52(15·1%)	10(19·2%)	17(3·27%)	10(19·2%)	15(28·8%)	
4.	Renal diseases	40(11·3%)	7(17·5%)	5(12·5%)	17(42·5%)	11(27·5%)	
5.	Tuberculosis—						
	(a) Peritoneal ..	21(6·1%)	2(9·5%)	10(47·6%)	5(23·8%	4(19·0%)	
	(b) Pulmonary .	14(4·0%)	.. ..	5(35·7%)	8(75·1%)	1(7·1%)	
6.	Malignant neoplasms—						
	(a) Stomach .. 3						
	(b) Rectum .. 2						
	(c) Liver .. 1	22(6·4%)	.. ..	.. ..	16 ..	6(27·2%)	
	(d) Ovary .. 6						
	(e) Secondaries in the peritoneum .. 10						
7.	Suppurative peritonitis ..	3	.. ..	.. ..	2 ..	1 ..	
8.	Anæmia	7	.. ..	2 ..	3 ..	2 ..	
9.	Lymphatic leukæmia ..	1	.. ..	.. ..	1 ..	.. ..	
10.	Other conditions—						
	(a) Amœbic dysentery ..	2	.. ..	1 ..	.. ..	1 ..	
	(b) Liver abscess ..	1	.. ..	.. ..	.. ..	1 ..	
	(c) Salpingitis ..	1	.. 1 ..	.. ..	.. ..	.. ..	

TABLE 2—SHOWING COMPOSITION OF DIETS IN A TELANGANA DISTRICT*

A. Cereals and Pulses (average for all income groups).

Articles	Ounces per consumption	Protein	Fat	Carbohydrates
		G.	G.	G.
Rice home pounded ..	6·7	17·9	1·3	164
Rice milled ..	0·9	1·7	0·1	20
Jawar	10·2	30·2	5·5	215
Other millets (Bajra, Ragi etc.) ..	6·6	17·5	5·6	133
Pulses (Bengal gram and red gram) ..	1·6	9·0	1·6	27
Total	26·0	76·3	14·1	559
Total calorie=2625 ..	..	305	84	2236

B. Consumption of other foods per income group

Ounces per consumption unit per day

Income per family per month	Vegetables	Vegetable Oil	Ghee	Milk & milk Products	Meat fish & egg
Rs. 1 to 5 ..	0·2	0·1	..	0·7	0·4
„ 6 to 10 ..	0·3	0·1	..	1·5	0·3
„ 11 to 20 ..	0·3	0·2	0·1	4·4	0·4
„ 21 to 30 ..	0·6	0·3	0·2	3·7	0·2
„ 31 to 50 ..	0·3	0·3	0·3	6·6	..
Above Rs. 50		..	..	4·2	0·3

*Based on and calculated from the figures given by Dr. M. B. Davar (1942).

TABLE 3—SHOWING DIETETIC HISTORY OF CASES OF NUTRITIONAL ASCITES

Vegetarian and abstainer	7 cases
Non-vegetarian	45 „
(a) History of drinking 20 to 30 ounces of 'toddy' or 'sendhi'* once or twice, a week ..	14 „
(b) Opium habit	2 „

*'Toddy' is the fermental sap of *Borassus flabelliformis* and 'Sendhi' that of *Phœnix sylvestris;* alcohol content of these is about 7%. They also contain some yeast.

TABLE 4—SHOWING BLOOD PICTURE IN 35 CASES OF NUTRITIONAL ASCITES

Number of R.B.C. per c.mm.	Number of cases	†Haemoglobin percentage	Number of cases
Less than 1 million	1	Less than 20	1
1 to 2 „	4	25 to 40	3
2 to 3 „	6	40 to 50	4
3 to 4 „	17	50 to 60	3
Above 4 million	6	60 to 70	9
		70 to 80	5
		80 to 90	5
		Above 90	4

†Haemoglobin was estimated by Hellige's haemometer; 100 per cent = 13·7 G. haemoglobin per 100 c.c. blood (Napier and Das Gupta, 1942).

Occupation—Most of the patients were poor-class cultivators, farm-labourers or village artisans. This is only to be expected, since a majority of the patients were from rural areas.

Geographical Distribution—The Hyderabad State is divided into two regions, the western black soil area known as Marathwada and Karnatak, and the eastern granitic area called Telengana; Hyderabad city is situated in the latter region. The staple diet of the population in the two regions differs; in Marathwada it consists mostly of *jawar*, and to some extent wheat, whereas in Telengana, rice is consumed along with *jawar* and other millets. On classifying the patients according to the districts to which they belong it was seen that the number of patients coming from a given area depended upon nearness of the place from Hyderabad city and ease of access there to. The figures, therefore, fail to show the real incidence of the condition in different parts of the State.

Dietetic History—The majority of the sufferers were from poor classes such as petty cultivators, farm labourers, village artisans and others. The diets of this class according to a survey by Nutrition Officer of the State (Dawer, 1942) and others (Wilson and Widdowson, 1942) consist of rice and millets with scarcely any vegetables, milk, meat or fish (Table II). The main features of the diets are (1) preponderance of carbohydrates, (2) deficiency of fat and above all, (3) deficiency of animal protein of good biological value *e.g.*, milk, meat and fish etc. Although this diet gives approximately 3000 calories per day and people lead an apparently healthy life, it is probable that any trivial illness like malaria, dysentery or diarrhœa etc. easily aggravates the state of malnutrition. In this series, almost all the patients gave a history of poor intake of green vegetables, meat and fish, and of little or no milk or milk products.

Mode of onset of Ascites—The onset of ascites and œdema was preceded by attacks of fever with rigors off and on (? malaria) for 1-6 months in 15 cases. Seven patients gave a history of fever of short duration without rigors. In four, a history of abdominal pain and vomiting was elicited and these on subsequent examination were found to be suffering from pyloric obstruction. No history of jaundice or hæmatemesis was obtained in any of these 52 cases, while history of melena was obtained in only 2 cases.

Clinical Features—The patients sought admission to the hospital mainly for the relief of abdominal enlargement, oedema and weakness; the duration of ascites generally varied from less than a month to five months in the majority of cases. They were extremely weak and hardly able to stand or walk about without support, their body-weights were generally below 100 lbs. (after the disappearance of ascites and oedema); lower weights down to 65 lbs. for an adult have also been observed. The skin was dry and inelastic; The mental condition was sluggish and sometimes they were not able to answer even simple questions promptly.

There was no jaundice, hæmatemesis or melena in any of the 52 cases. The veins of the anterior abdominal wall were prominent in only 9 cases;—of these 5 recovered completely, 3 were discharged much improved and one died. An autopsy was done in the last case but it did not show any evidence of cirrhosis of the liver. Thus it will be seen that even though the abdominal veins were prominent in some of these cases—they did not necessarily indicate a bad prognosis commonly associated with advanced cases of portal cirrhosis. Oedema of the extremities was present in 42 cases.

Heart and Pericardium—The heart on clinical examination did not show any abnormality in most of the cases. Electrocardiograms were taken in 5 cases; out of these left ventricular preponderance was noted in one and extra-systoles in another, the remaining three were normal. The blood pressures were generally low; in the majority of cases the systolic reading was between 80 and 110 m.m.Hg., and the diastolic pressure between 60 and 80 m.m.Hg., the averages of 46 cases were systolic 104 m.m.Hg., and the diastolic 70 m.m.Hg., Pericardial effusion was detected in 3 cases and one of these, was fatal; in the other two it was associated with pleural effusion and both of these made a complete clinical recovery in a fairly short period without recourse to mechanical removal of fluid by paracentesis. Manifestations of beri-beri such as dyspnœa, tachycardia, engorged neck veins and signs of right heart failure associated with peripheral neuritis were found only in 2 cases; one of these showed pericardial effusion and was fatal; the other made an uneventful recovery under rest, a liberal diet and few injections of thiamin.

Lungs and Pleuræ—Pleural effusion was detected in 7 cases and two of these had also pericardial effusion. In all other cases, the routine physical examination supplemented where necessary by radiography of the chest did not reveal any abnormality of the lungs or pleuræ.

The Liver was palpable in 9 cases; these were:

1. Moderate enlargement (3 fingers below the costal margin
   (*a*) History of chronic malaria .. 2
   (*b*) Ascariasis and anaemia .. 1
   3 cases
2. Palpable only in the epigastric region and soft
   (*a*) Wet beri-beri 1
   (*b*) Ascites and left-sided pleural effusion 1
   (*c*) Ascariasis 1
   (*d*) Causation not known .. 3
   6 cases

The Spleen—was palpable in 16 cases; 7 of these gave a definite history of attacks of fever with rigors on and off, for a varying period (1-6 months) before the onset of ascites. Examination of blood films revealed the presence of gametes of *P. Falciparum*—in one case and trophozoites of *P. Vivax* in another; the rest were negative.

As regards the alimentary system, the appetite and digestion of these patients were generally fair; a certain number of them were constipated while a few others had diarrhœa without blood or mucus in the fæces. In

four cases ascites was associated with pyloric obstruction, these are: (1) has had posterior-gastro-jejunostomy performed for relief—ten months before admission for ascites; no peritoneal adhesions or evidence of malignancy noted, recovered from ascites; (2) admitted for ascites and recovered; presented signs of—pyloric stenosis and the operation of posterior gastro-jejunostomy done; the liver and peritoneum healthy, (3) admitted for ascites and recovered; readmitted six months later for ascites, vomiting and indigestion; radiogram after a barium meal showed six hours residue in the stomach; serum proteins 5·18 per cent, albumin 2·31 per cent and globulin 2·87 per cent; improved satisfactorily; (4) admitted for ascites and presented signs of pyloric obstruction, left the hospital a week after admission.

The writer had occasion to witness the presence of moderate quantities of ascitic fluid in three cases which were being operated for the relief of definite pyloric stenosis. The livers in all these cases appeared healthy on naked eye examination and were soft. The pyloric mucosa of two of these was examined histologically and no evidence of malignancy found. The probable cause of ascites in such conditions is that the state of sub-clinical malnutrition is aggravated by indigestion and vomiting, leading to hypoproteinæmia and ascites. Davis and Getzoff (1942) have classified hypoproteinæmia into three categories, (1) pre-hepatic, (2) hepatic and, (3) post-hepatic. These cases then come under group (1). Holmes (1944) has reported a similar case of a middle-aged woman whose serum proteins were as low as 3·3 per cent, albumin 1·96 per cent and globulin 1·32 per cent and who recovered after transfusions of reconstituted plasma.

Avitaminosis—The signs of peripheral neuritis were present in 16 cases; these are:—

(*a*) Calf-tenderness	5 cases
(*b*) Calf-tenderness with brisk knee jerks ..	1 case
(*c*) Calf-tenderness with sluggish knee jerks	2 cases
(*d*) Diminished or absent knee jerks but no calf-tenderness	8 cases
	16 cases

As described earlier, cardiac manifestations of beri-beri like tachycardia, dyspnœa and engorged neck veins were found only in two cases. Of other signs of avitaminosis, one patient had angular stomatitis, glossitis and pellagrous dermatitis; the skin of another showed phrynoderma, and two complained of night blindness.

Laboratory Findings

Urine—The urine was generally scanty; 18 cases had a urinary output of less than 12 ounces in 24 hours. The specific gravity varied between 1005 and 1020 but was generally about 1012. A trace of albumin was found in 34 cases but this in most cases disappeared subsequently. Sugar, bile salts and pigments were absent in all the cases. None showed the presence of blood cells or casts in the urine.

Fæces—The fæces were examined in 22 cases; none of these showed the presence of entamœba histolytica or any evidence of chronic dysentery. In three children ascites was associated with *ascariasis* and these made prompt recovery on suitable treatment. Ova of ankylostoma duodenale were found in the fæces of four patients. In these cases signs of gross cardiac dilatation or decompensation as described by Gunewardane (1935), and Heilig (1941) were not found; three of them recovered from ascites without paracentesis and the fourth left the hospital shortly after admission.

Blood Picture—The blood pictures were done in 35 cases and 31 of these showed varying grades of anæmia; severe (R.B.Cs. below 3 million per c.mm.; and hæmoglobin less than 60 per cent) in 11 cases, and moderate in the rest (Table IV). The anæmia was commonly hypochromic and normocytic or slightly microcytic but rarely macrocytic. There was moderate leucopenia in some cases with a history of chronic malaria, and slight eosinophilia in cases of helminthic infection; in the rest the leucocyte picture was fairly normal.

Blood Chemistry—The serum proteins* were estimated in eight cases and all of these showed marked hypoproteinæmia. The average values are shown in Table V and compared with those obtained in other conditions. It will be seen that the values are far below the normal and there is a reversal of albumin/globulin ratio.

The individual cases are shown below:

S.No.	*Case*	*Total proteins %*	*Albumin %*	*Globulin %*	*Remarks.*
1.	Na	3·37	1·70	1·67	Marked emaciation and anæmia, died.
2.	Chi	5·68	2·43	3·25	After 18 days, total 5·74, albumin 2·83 and globulin 2·91; diuresis started & œdema disappeared; ascites considerably diminished.
3.	Li.	5·81	2·34	3·47	After one month, total 5·93, albumin 3·00 and globulin 2·93, no ascites or œdema, general condition improved.
4.	R.	4·62	2·18	2·44	Marked emaciation and anæmia, died.
5.	Ti.	4·43	2·12	2·13	Recovered.
6.	Ra.	6·25	2·25	4·00	Do.
7.	Rg.	4·50	1·31	3·19	After three weeks, total 4·93, albumin 1·56, globulin 3·37; slightly improved.
8.	Lin.	5·18	2·31	2·87	Recovered.
	Average.	4·98	2·08	2·90	Albumin/globulin. ratio=1:1·4

*(*a*). The serum proteins were estimated by a modified Howe's method of digestion and direct Nesslerization as described by Hawk and Bergein (1931).

(*b*). Normal values given by Harrison (1939) are, total protein 5·6 - 8·5%, albumin 3·8 - 5·2% and globulin 1·2 - 2·9%; ratio 1·4:1.

The *Van den Bergh test* on serum was done in 8 cases; the reaction was negative in 3 cases and in the rest it was faint indirect positive and the serum bilirubin[1] was found to be less than 1 mgm. per 100 c.c. (average 0·25 mgm. per cent).

The other constituents of the blood were:—

(*a*) Urea[2] estimated in 4 cases (oxalated blood) ..	14 to 41 mgm. per 100 c.c.	
(*b*) Non-protein nitrogen* of the serum estimated in 4 cases	21·6 to 28·8	„ „ „
(*c*) Cholesterol[3] estimated in 4 cases (oxalated blood)	120 to 210	„ „ „
(*d*) Chlorides[4] estimated in 6 cases (Folin & Wu filtrate of the whole blood) ..	438 to 585	„ „ „

A positive *Wassermann Reaction* was obtained only in 6 out of 36 cases.

Ascitic Fluid—As most of the cases recovered without recourse to mechanical removal of fluid by paracentesis abdominis, this operation was done only in three instances. In two cases it was done soon after admission to relieve excessive distension of the abdomen and they recovered without the need of repeating the operation; the ascitic fluid was a transudate with specific gravity 1006-1010, protein 0·15-0·30 per cent, chlorides 0·702 per cent; an occasional lymphocyte and endothelial cell was found on microscopic examination of the centrifuged deposit. The third was a case of ascites and pleural effusion; she did not improve even after paracentesis and died one month after admission. The ascitic fluid in this case showed a high specific gravity (1022) and contained 0·60 per cent of protein; post-mortem examination revealed a mild recent peritonitis; the liver, heart and kidneys were, however, healthy.

The Takata-Ara Reaction—This test was performed on 105 cases of ascites from all causes; Crane's modification as described by Weiss (1935) was adopted and the results were noted as strong positive, positive, doubtful and negative (Table VII). Out of 16 cases of nutritional ascites a positive reaction was obtained only in 3 cases (18·7 per cent) and negative or doubtful in the rest, (81·3 per cent). Clinically, a majority of these cases (11 out of 16) recovered and 3 cases were discharged after considerable improvement. On the other hand, out of 69 cases of cirrhosis of the liver a positive reaction was obtained in 59 (86·7 per cent). Most of these patients were fairly advanced cases of cirrhosis of the liver and the clinical course was one of progressive liver failure. In 9 instances, although the reaction was negative or doubtful, the course was not very different from that of the positive ones. From the point of view of prognosis, therefore, a negative reaction, when not associated with concomitant advanced liver disease, gives a better hope of recovery, although it does not necessarily rule out liver cirrhosis.

Liver Function Tests—The Rose-Bengal test as carried out by Radhakrishna Rao (1933) was done on 12 cases. A high retention of the dye was noted only in 2 cases; both of these cases, however, recovered; one after an initial paracentesis and the other without any paracentesis. The first case was seen six months later and there were no obvious signs of liver decompensation.

Renal Function Tests—The phenol-sulphonephthalein excretion test was done on 12 cases. The two-hours excretion was fairly normal in all but three cases in which it was less than 50 per cent. The latter, however, did not present any other sign of renal failure such as albuminuria or cylindruria etc., lack of free diuresis is probably responsible for the defective excretion.

Treatment

The patients were placed on bread and milk diet (Table VIII) which yielded, on an average—protein 69 G., fats 49 G., and carbohydrates 377 G. This was supplemented by a sweet lime and in most cases half an ounce of dried brewer's yeast daily in the form of a confection. The routine mixture consisted of: Pot. Acetas gr. x, Spt. Aetheris m. xx, Tr. Digitalis m. x to xv, Inf. Scoparii ad oz. i, Sig. oz. 1 t.d.

In some cases even this mixture was not ordered but only a plain carminative mixture. Iron in the form of Blaud's pill grs. 20 daily was given for anæmic cases, so also a few injections of liver extract and thiamin hydrochloride (10 mgm. daily) for serious cases. It was not possible to arrange to observe the effect of liberal administration of liver extra and thiamin. An initial injection of a mercurial diuretic (neptal 0·5 c.c. intramuscularly) was given in a few instances to relieve excessive distension of the abdomen.

Course—Under this regime the patients gradually improved, the urinary output increased, and œdema and ascites disappeared. A liberal mixed diet (Table VIII B) was then allowed. It was seen in a few instances that early allowance of a liberal diet containing salt leads to reappearance of œdema to disappear again on resumption of 'bread and milk' diet. *The loss of œdema and ascitic fluid, as judged by a fall in weight of the patient, was on an average from ¾ to 1½ lb. per day.* After the disappearance of ascites and œdema the patients began to gain real weight, their general condition considerably improved and they were inclined to go back to their work. The average period of hospitalisation for 32 cases (61·5 per cent of the total) who made a complete clinical recovery without paracentesis was only 37 days. The following account illustrates the favourable course of these cases:

1. Rameshwaramma aged 12 years, admitted on June 6, 1944 for abdominal enlargement of one month's duration with a history that the child had been suffering from bouts of fever for six months and that during this period she was placed on a very restricted diet (boiled rice with a little chilly powder, no milk or vegetables etc.,) on the advice of a *hakeem;* the

1. The Van den Bergh quantitative test—McNee and Keefer's method using cobalt standard (Harrison, 1939).
2. Blood urea—urease titration method (Harrison, 1939).
3. Blood cholesterol—colorimetric method of Myers & Wardell (Harrison, 1939).
4. Blood chlorides—Whitchorn's method.

* Non-protein nitrogen of the serum was estimated by Folin and Wu's method as described by Hawk and Bergeim (1931).

TABLE 5—SHOWING SERUM PROTEINS AND HEPATIC AND RENAL FUNCTION TESTS ON CASES OF ASCITES

Serial Number	Disease	Serum Proteins: Number of cases	Average total Protein (G. per 100 c.c.)	Albumin (G. per 100 c.c.)	Globulin (G. per 100 c.c.)	Ratio	Hepatic function (Rose-Bengal test): Number of cases	Average of 8 minute-dye-retention	Renal function (Phenol sulphonphthalein test): Number of cases	Average of 2 hour-excretion
1.	Portal Cirrhosis ..	8	5·59	2·13	3·46	1:1·6	15	76·3%	10	54·0%
2.	Biliary Cirrhosis ..	4	6·10	2·63	3·47	1:1·3	2	74·2%	..	..
3.	Nutritional Ascites ..	8	4·98	2·08	2·90	1:1·4	12	60·2%	12	61·7%
4.	Chronic Nephritis with Ascites & Oedema	2	3·34	1·40	1·93	1:1·3	..	..	12	41·5%
5.	Abdominal Tuberculosis	2	7·21	2·81	4·40	1:1·5	3	70·8%	..	..

TABLE 6—SHOWING THE RESULTS OF EXAMINATION OF ASCITIC FLUID IN VARIOUS DISEASES

Serial Number	Disease	Specific Gravity: Number of cases	Average specific gravity	Protein: Number of cases	Average Protein (G. per 100 c.c. by Esbach's method)	Chlorides: Number of cases	Average Chlorides (G. per 100 c.c.)	Bilirubin. Number of cases	Aberage bilirubin content mgm per 100 c.c.)	Remarks
1.	Portal Cirrhosis ..	45	1008	43	0·43	4	0·571	19	0·69	Fluid clear, light yellow; a few lymphocytes and endothelial cells.
2.	Chronic Nephritis with Oedema & Ascites ..	10	1007	9	0·275	6	0·602	..	..	Fluid generally colourless; an occasional lymphocyte.
3.	Cardiac Insufficiency ..	1	1020	1	0·32	1	0·580	1	0·2	Fluid deep straw colour; a few lymphocytes and endothelial cells.
4.	Abdominal Tuberculosis ..	4	1017	4	1·2	1	0·580	2	2·6	Fluid light yellow, one case frankly hæmorrhagic R.B.C.'s and lymphocytes in fair number, T.B. found in one case.
5.	Malignant deposits in the peritoneum	3	1012	3	1·13	1	0·585	3	2·9	Fluid turbid; R.B.C.'s and endothelial cells in excess; in one case cells of lymphosarcoma found.
6.	Nutritional Ascites ..	2	1008	2	0·245	2	0·640	2	0·4	Fluid clear, light straw colour; occasional lymphocyte and endothelial cell.

TABLE 7—SHOWING RESULTS OF TAKATA-ARA REACTION* ON 105 CASES OF ASCITES

S.No.	Disease	Number of cases	Strong postive	Positive	Doubtful	Negative	Remarks
1.	Cirrhosis of the liver (68 cases)						
	(a) Portal cirrhosis	60	15	36	2	7	Positive in 86·7%
	(b) Biliary „	5	2	3	..	..	
	(c) Infants biliary cirrhosis ..	3	1	2	..	..	
2.	Malignant deposits in the liver ..	2	1	..	..	1	
3.	Peritoneal Tuberculosis	9	..	3	3	3	
4.	Nephritis	7	..	3	..	4	
5.	Cardiac Insufficiency	3	..	2	..	1	
6.	Nutritional Ascites—						
	(a) Sera	13	..	2	2	9	Negative or doubtful in 81·3%
	(b) Ascitic fluid	3	..	1	1	1	
7.	Controls—						
	(a) Normal sera	2	..	..	..	2	
	(b) Hydrocele fluids ..	8	..	..	..	8	

*The test was done on Ascitic fluid in all cases other than 6 (a).

abdomen began to enlarge gradually a month before admission. On examination there was ascites and œdema on the lower extremities; the abdominal veins were showing through the skin; marked emaciation; pulse 96 per minute, regular; heart boundaries within normal limits; lungs clear; liver not palpable, no jaundice; spleen palable 2 fingers breadth below the costal margin. The urine was scanty and did not show albumin, sugar or bile. Blood: R.B.C's 3·07 million per c.mm., W.B.C's. 3,100 per c.mm. (polymorphonuclears 66 per cent, lymphocytes 29 per cent and eosinophils 5 per cent); malaria parasites not found. Blood chemistry: proteins in serum 6·25 per cent, albumin 2·25 per cent, globulin 4·00 per cent; chlorides 481 mgm., cholesterol 127 mgm., urea 14 mgm., and non-protein nitrogen 27·6 mgm., per 100 c.c. The Van den Bergh test indirect positive, serum bilirubin 0·8 mgm. per 100 c.c. The Takata-Ara on serum was negative. Hepatic function:—Rose-Bengal dye retention at the end of 8 minutes 72·5 per cent. Renal function: phenol-sulphone-phthalein 2 hours excretion 62·0 per cent. Kahn's test on serum negative. Radiological examination of the chest did not reveal any abnormality.

The child was having fever 102°-103°F. for three days after admission and this subsided under quinine therapy. She was placed on routine bread and milk' diet (Table VIII) and was given Blaud's pill 20 grs. a day. On this regime the child began to progress satisfactorily, the ascites and œdema were getting less and her general condition was improving. By July 7, 1944 *i.e.*, four weeks after admission, there was no œdema or ascites; she was able to walk about and was asking for more food. The circumference of the abdomen which was 29·75" on admission (June 6) came down to 22·75" on July 7 (a reduction of 7 inches in four weeks). The loss of ascitic fluid was also indicated by weight changes; her weight on admission was 74 lbs. with ascites; 62 lbs. on July 7 and 54 lbs. on July 12. No paracentesis was required to relieve ascites.

The features of the above case are (1) subsistence on a protein-poor diet for nearly six months during the course of fever (? malaria) leading to gradual depletion of plasma proteins resulting in the appearance of œdema and ascites, and (2) rapid recovery on a liberal and balanced diet.

2. Venkiah, male Hindu (Kapu), 30 years, cultivator, admitted on January 30, 1944 for abdominal enlargement and scanty urine of one month's duration. He stated that his daily diet consisted mainly of rice and jawari bread with a little butter-milk; vegetable and meat only occasionally. He had suffered from repeated attacks of fever with rigors for nearly three months before his abdomen began to swell. On examination the patient appeared poorly nourished and could walk about only with difficulty; there was a moderate accumulation of free fluid in the peritoneal cavity and slight pleural effusion; pericardial effusion was also detected on radiological examination of the chest (6-2-44); pulse rate 60 per minute, regular; blood pressure, systolic 80 mm. Hg., liver and spleen not palpable. Urine: 12 ounces a day, clear, specific gravity 1020, a trace of albumin , no casts. Blood R.B.C's. 4·5 million per c.mm. hæmoglobin 95 per cent; W.B.C's. 6,200 per c.mm., picture normal. Hepatic function: Rose-Bengal 8 minutes dve retention 62·5 per cent; Renal function: phenol-sulphone-phthalein 2 hours excretion 63 per cent. The W. R. of serum negative.

The patient was given an ordinary diuretic mixture and two injections of neptal 0·5 c.c. each; he was placed on the hospital mixed diet (Table VIII). By February 2, 1944, the urinary out-put began to increase and subsequently a gradual fall in weight (due to loss of ascitic fluid) occurred. By March 3 (about 5 weeks after admission), the ascites, pleural and pericardial effusions had completely disappeared without mechanical removal and the patient gained some real weight. The disappearance of the pericardial effusion was confirmed by repeating the radiological examination of the chest on 26-2-44. The circumference of the abdomen which was 30" on admission (January 31, 1944) came down to 25·75" on February 25, 1944. The patient was discharged on March 3, 1944 as he was now fairly well and inclined to go to his farm work. A follow-up letter received nearly 9 months later showed that he was keeping well and that there was no ascites or œdema.

Follow-up—It was found difficult to keep in touch with the patients after they had left the hospital. Out of 15 patients who responded to follow-up letters 5 were known to be keeping well without recurrence of ascites a year after their discharge from the hospital; one patient was known to be well for nearly two years; one was readmitted with ascites 9 months after discharge and recovered again, while the remaining 8 cases were known to be well for periods of 2 to 9 months.

It may be noted here that at least four patients who were classed as nutritional in the first instance and discharged after a clinical recovery, returned subsequently with a picture of cirrhosis of the liver 2, pulmonary tuberculosis 1, and adhesive pleurisy 1.

Aetiology

To sum up the clinical and laboratory findings in cases classed in the present study as "nutritional ascites", it is a condition affecting the young adults and the middle aged, mostly of the cultivator and labouring classes whose *diet is of poor quality and deficient in protein, fats and protective foods. It is characterised by the presence of ascites, œdema, and in some cases, pleural and pericardial effusions. There is a moderate degree of anæmia in most of the cases and hypoproteinæmia; signs of gross cardiac, renal or hepatic insufficiency are absent; the Takata-Ara test is negative or doubtful in over 80 per cent of the cases; recovery in the majority of cases,* under hospitalization and a diet which is better balanced and more liberal than that the patient was getting at home, *is fairly rapid and complete;* some of these are known to be free from ascites or œdema for considerable periods after leaving the hospital.

No accurate data are available to show the relative frequency of ascites in different provinces of India and its relation to diet and other conditions. It may be mentioned, however, that the data from pathology departments of some of the medical colleges show that in a certain percentage of cases of ascites, no definite causation could be discovered on post-mortem examination. Various views have been held in the past regarding the common cause of ascites in India. Megaw (Lucknow, 1921 and Calcutta, 1924) thought that the common form of ascites in India was not due to cirrhosis of the liver but to a fibrosis of the peritoneum as a result of chronic bacillary dysentery. He termed it as "Chronic dysenteric peritonitis" and observed that it was a disease of the poor class and when well established there was little prospect of improvement. Bose and Banerjee (1928) considered that cases of ascites of 'non-renal, non-cardiac and apparently non-hepatic origin were common among adult Indian males in Bihar'; the poor classes were mostly affected and repeated accumulation of fluid after paracentesis was a characteristic feature; all the 19 patients observed by them had left the hospital with 'varying amounts of improvements', but there was no follow-up of further progress. In the opinion of the authors the peritoneal effusion was probably due to a "disturbance of absorptive power of the upper part of the peritoneum caused by a previous dysenteric

infection". Hameed (1933) studied the post-mortem findings in a series of 19 cases of 'endemic ascites' at Lucknow and came to the conclusion that the disease was common among the poor cultivators; that malaria and avitaminosis lead to deterioration of the health of the intestinal mucosa which gets infected, and that it was probable that the toxin absorbed from the intestines damage the liver. He reported cirrhotic changes in all the 19 cases of liver examined. Radhakrishna Rao (1932) as a result of a study of 69 cases of ascites at Vizagapatam found that the common causes of ascites were cirrhosis of the liver and cardiac decompensation; that cases of chronic dysenteric peritonitis were rare and that hepatic cirrhosis was the probable cause even in cases of ascites with a previous history of dysentery.

As compared to the findings in the above instances, the present study shows that although cirrhosis of the liver is the most frequent condition associated with ascites (37 per cent) there was a considerable number of cases (15 per cent) classed as nutritional in which no definite signs of hepatic insufficiency could be detected. Further a majority of the latter recovered without recourse to mechanical removal of the fluid by paracentesis. It is however, quite possible that minor degrees of hepatic insufficiency may go undetected; the liver function tests have got their own limitations seeing that the organ has got remarkable power of restoration after injury and that a small amount of healthy liver tissue may meet the normal requirements (Mann, 1941). But coming to the prognosis of the disease Rolleston and Mc Nee (1929 *a*) point out that in uncomplicated cases of cirrhosis of the liver, ascites appears late, that it is a grave event and that the patient does not survive long enough to require tapping more than two or three times. Recent literature, however, goes to show that such a view is not quite tenable as, among others, Patek and Post (1941) have reported a prolongation of the survival period of cases of cirrhosis of the liver treated with a nutritious diet, supplemented with vitamin B complex, as against the controls.

Cases of polyserositis of unknown aetiology are described under the names of Pick's disease, Concato's disease and Zuckergussleber (sugar-iced liver). The main pathological change in these cases, according to Boyd (1935), and Rolleston and Mc Nee (1929 *b*) is a chronic proliferative serositis most marked in the vicinity of the diaphragm and they are characterised by recurrent ascites; the fluid is an exudate with a specific gravity of more than 1015. Boyd (1935) mentions one case whose abdomen had to be tapped more than 300 times. This is in contrast to the present series of cases where the ascitic fluid was found to be a transudate and recovery was possible without paracentesis in the majority of the cases. The importance, however, of a regular and systematic follow-up for a long period is quite obvious.

Ascites and Oedema in Conditions of Famine and Starvation

Semi-starvation as a cause of ascites is mentioned by French (1936) in the Index of Differential Diagnosis occurring in conditions of famine, but no detailed clinical picture is available. Chen (1942) observed œdema attributable to malnutrition in 14 per cent of children under 12 years admitted to pediatric section of the Shanghai refugee camp. Ascites was present in some of them and also hypoproteinæmia in most of the cases in which the serum proteins were estimated. From China again, Lycock (1944) reported his impressions of slow starvation among the destitutes who migrated from occupied to free China in search of food; œdema and ascites were observed in some of these cases and were treated successfully by a suitable diet, aided in some cases by iron, liver extract and vitamin B. Stevenson (1944) has noted the presence of œdema attributable to malnutrition among the prisoners of war repatriated from Germany 12 to 15 months after their detention in the prison camps. Cases of nutritional œdema associated with ascites in some instances, were also observed among the destitutes in Calcutta in the year 1943-44 (Indian Research Fund Association, 1944). These were characterised by emaciation, low blood pressures and diminished plasma proteins with alteration of albumin/globulin ratio, and a large majority of them have improved on hospitalisation and a liberal diet. The present series of cases, however, occurred in a population not looked upon as famine-stricken, but as pointed out earlier, their usual diet itself was so poor in quality that any trivial illness could probably aggravate the state of sub-clinical malnutrition and lead to this condition.

Starling (1933) showed the importance of blood colloids in regulating the balance between intravascular and extravascular fluids in the body. Oedema has been produced experimentally in dogs by repeated plasmaphoreses by various workers—Barker and Kirk (1930), Durrow *et al* (1932) and Weech *et al* (1933). The last group of investigators observed œdema and in one case ascites, when plasma albumin fell below 1·0 to 1·5 G. per cent. They have also observed œdema in dogs fed on a protein-deficient diet. Radhakrishna Rao (1942) while studying the intestinal changes in monkeys placed on a 'poor South Indian diet' (consisting mainly of rice and negligible quantities of vegetables and pulses) has noted the occurence of œdema in some of them and this disappeared when the animals were allowed a more liberal diet. Recent studies go to show that the permeability of the capillary endothelium is liable to be affected by anoxæmia, the action of toxins or the lack of vitamins, particularly the B and C group. It would, therefore, appear that ascites in cases classed as nutritional is attributable mainly, if not entirely, to hypoproteinæmia (diminished colliodal osmotic pressure of blood), and clinical recovery is possible under a regime of rest and a balanced nutritious diet.

Summary

1. An analysis of 343 consecutive cases of ascites studied during a period of two years in the Osmania Hospital, has shown that ascites was associated with cirrhosis of the liver in 37 per cent, cardiac insufficiency 15 per cent, renal diseases 11 per cent, tuberculosis (pulmonary and peritoneal) 10 per cent and neoplasms of the abdominal and pelvic viscera 6 per

TABLE 8—SHOWING COMPOSITION* OF STANDARD DIETS OF THE HOSPITAL GIVEN TO ASCITES PATIENTS

No. 3 Bread diet

Article	Quantity	Main constituents in Grammes Protein	Fat	Carbohydrate
Bread	.. 20 ozs.	40	5	308
Milk	.. 20 „	27	37	25
Sugar	.. 1 „	..	..	28
Butter	.. ¼ „	..	5	..
Tea (with milk and sugar.)	.. ..	2	2	16
Total in 24 hours	.. ..	69	49	377

Calorific value=2375

No. 6 Mixed diet

Article	Quantity	Main constituents in Grammes Protein	Fat	Carbohydrate
Chappati (Wheat flour)	.. 8 ozs.	27	3	163
Meat	.. 4 „	21	15	..
Rice	.. 8 „	16	1	181
Ghee	.. ½ „	..	12	..
Dhall	.. 1 „	7	1	16
Vegetables	.. 4 „	2	..	9
Tamarind	.. ½ „	..	..	10
Onions	.. 1 „			
Milk	.. 1½ „	2	3	2
Salt	.. ½ „			
Bread (Wheat flour)	.. 4 „	13	1	85
Butter	.. ¼ „	..	6	..
Tea	.. 1/16 „	..	..	..
Total in 24 hours.	.. ..	68	42	456

Calorific value=2512

* From the report on "Institutional Diet Surveys" by the Nutrition Officer, H. E. H. the Nizam's Govt., 1347F.

cent of all cases. In 52 cases or 15 per cent no definite organic disease was detected; these were classed as ascites due to 'nutritional deficiency'.

32 out of these 52 were discharged as clinically recovered and 10 improved. The attempt at a follow-up was not very successful, but at least 15 are known to be in good health for varying periods upto 2 years after discharge.

2. The clinical and laboratory findings in nutritional ascites are discussed.

The condition is more common among males (males: females 7:1) affecting the young adults and the middle-aged, mostly of the cultivator or labouring classes, whose diet is of poor quality and deficient in proteins and protective foods. It is characterised by the presence of ascites, œdema and in some cases, pleural and pericardial effusions. There are signs of moderate degree of anæmia and hypoproteinæmia; no detectable signs of cardiac, renal or hepatic insufficiency were present; recovery takes place in the majority of cases under hospitalization with a diet more liberal and well-balanced than the usual diet of the patients at home.

3. The results of Takata-Ara reaction on 105 cases of ascites are presented and it is pointed out that a negative reaction, when not associated with advanced liver disease, gives a better hope of recovery although it does not necessarily rule out liver cirrhosis.

4. Various views on the common causes of ascites in India are discussed. It is shown that the course of the present series of 52 cases is in marked contrast to that of well established cases of cirrhosis of the liver, polyserositis or chronic peritonitis.

5. While the occurrence of œdema and less commonly ascites is recognized under famine conditions, these cases occurred in a population not looked upon as famine-stricken.

REFERENCES

BOSE, A. N., AND BANERJI, B. N.—*Indian J. M. Research*, **16**:665-74, 1928.

BOYD, W.—'The Pathology of Internal Diseases'. Lea Febiger, Philadelphia, 1935.

BARKER, M., AND KIRK, E. J.—*Arch. Int. Med.*, **45**:346, 1930.

CHEN, JI—*Am. J. Dis. Child.*, **63**:552-80, 1942.

DAWAR, M. B.—*J. Indian M. A.*, **12**:42, 1942.

DAWAR, M. B.—*J. Indian M. A.*, 42, 1942.

DARROW, D. C., HOPPER, E. B., AND CARY, M. K.—*J. Clin. Invest.*, **11**:683, 1932.

DAVIS, H. A. AND GETZOFF, P. L.—*Arch. Surg.*, **44**:1071, 1942.

FRENCH, H.—'An Index of Differential Diagnosis of Main Symptoms, 5th edition, Simpkin Marshall Ltd., London, 1936.

GUNEWARDENE, H. O.—Heart Diseases in the Tropics. Butterworth & Co. (India) Ltd., Calcutta, 1935.

HARDIKAR, S. W., AND GOPAL RAO, V.—*J. Indian M. A.*, **13**:1, 1943.

HEILIG, R.—*Indian M. Gaz.*, **76**:519, 1941.

HOLMES, J. MACDONALD—*Brit. M. J.*, **1**, 1944.

HAWK, P. B. AND BERGEIM, O.—'Practical Physiological Chemistry', 10th edition, J. and A. Churchill, London. 1931.

HARRISON, G. A.—'Chemical Methods in Clinical Medicine', 2nd edition. J. & A. Churchill, Ltd., London, 1939.

HAMEED, M. A.—*J. Indian M. A.*, **2**:9, 1933.

Indian Research Fund Association—Report of the work done by members of the School of Tropical Medicine, Calcutta, in connection with enquiry into effects of starvation. Sept., 1943 to March 1944.

LAYCOCK, H. T.—*Brit. M. J.* **1**:6677, 1944.

MEGAW, J. W. D.—*Indian M. Gaz.*, **56**: 9 Sept., 1921.

MEGAW, J. W. D. AND MAITRA, G. C.—*Indian M. Gaz.*, **59**: May, 1924.

MANN, F. C.—*J.A.M.A.*, **117**, 19, November 8, 1941.

NAPIER, L. E., AND DAS GUPTA, C. R.—'Haematological technique.' 2nd Edn. Thacker, Spink and Co., Ltd., Calcutta, 1942.

PATEK, JR. A. J. AND POST, J.—*J. Clin. Invest.*, **20**:481-505, 1941.

RADHAKRISHNA RAO, M. V.—*Indian J. M. Research*, **20**: October, 1932.

Idem—Ibid., **20**:4, April, 1933.

Idem—Ibid., **30**:2, April, 1942.

ROLLESTON, H., AND MCNEE, J. W.—'Diseases of the Liver, Gall-bladder and Bile Ducts'. 3rd edition. Macmillan & Co., Ltd., London, 1929*a* p. 274.

Idem—Ibid., p. 135, 1929*b*.

STEVENSON, D. S.—*Brit. M. J.*, May 13, 1944.

STARLING, E. H.—'Principles of Human Physiology', 6th edition, edited by C. L. Evans and H. Hartridge. J. & A. Churchill, London, 1933.

WILSON, D. C. AND WIDDOWSON, E. M.—*Indian M. Research Memoirs*, 34, March, 1942.

WEECH, A. A., SNELLING, C. E. AND GOETTSEH, E.—*J. Clin. Invest*, **12**:305, 1933.

WEISS, S.—'Diseases of the liver'. Paul B. Hoebar, Inc., New York, 1936.

GENESIS OF NYSTAGMUS

T. K. UTTAM SINGH, D.O.M.S. (LONDON),
New Delhi

The main object of this contribution comprises merely of offering an explanation of those points which supply the missing links in the present conception of the development of nystagmus. The conclusions have been drawn from facts already known. It seems that the real deductions regarding nystagmus somehow have escaped scientific attention so far. Some new views are also put forward which are different from those now commonly held. We will begin with a general survey of the known facts on the subject

GENERAL SURVEY

Nystagmus is that condition of the eyes in which they are subject to constant and uncontrollable movements, which may be horizontal, vertical, rotatory, mixed, irregular, circumductory or disjunctive. According to Foster Moore, they consist of a "quick movement with a slower return." But I consider it more correct to describe it as "a slow movement with a quick return." At the outset it may appear that the description is the same but only the other end of the movements is mentioned first. But as a matter of fact, as will soon be clear, that other end actually occupies the first position in the genesis of nystagmus and therefore needs must be mentioned first.

The causes of the condition are classified as (*a*) hereditary, (b) voluntary, (*c*) due to bilateral visual defect originating in early life, (*d*) occupational—miner's (*e*) due to general nervous disease, (*f*) labyrinthine and (*g*) owing to defective formation of the skull, *e.g.*, in oxycephaly, Mongolian idiocy, etc.

Different hypotheses have been offered to explain the development of the various types of nystagmus. But their study does not seem to give the real basis of its production but merely supplies descriptions of the observations made at different stages of its growth. Actually, as will be clear from this discussion, there seems to be only one explanation applicable to all the causes of nystagmus and it is only when any cause leads to the condition which makes that explanation applicable, that nystagmus is actually developed.

The Main Question—It has been observed that when the central vision is affected in early life, that is before fixation is developed, nystagmus takes place. True, but why? What is the explanation? And in the development of miner's nystagmus, fixation as well as the central vision are intact before its development and nothing occurs to cause any pathological change in the tissues or structures concerned. Why then is nystagmus still caused in miners when they have to work in very dim light, in awkward positions for long?

Analysis—(A) In hereditary nystagmus, the condition is ascribed to deficiency of pigment in the retinal epithelium, due to albinism, partial or complete. But does that lead to deficient development or maldevelopment of the macula? There is no reason why it should, nor is there any evidence of a lesion of nervous pathways or the lower or higher cortical centres of the macular vision. And as a rule, in the cases examined, the macula has appeared to be of normal development. But still a varying degree of nystagmus has been present in them. What is the reason?

(B) In voluntary nystagmus, how are some people able to produce that condition?

(C) In bilateral visual defect in early life, the development of the central vision, according to Spicer, is interfered with and the lack of co-ordination of the muscles is the result. But then, what exactly is the nature of the interference and why do the eyes begin to oscillate perpetually? And considering that the nystagmoid movements in such cases are not irregular, haphazard or disorderly, but regular, rhythmic and orderly though involuntary, where is the justification to suppose that the co-ordination of the muscles is lacking? The muscles tests, both for the extrinsic and intrinsic ones, prove the contrary. And why does posterior uveitis so often cause nystagmus?

(D) In occupational (or miner's) nystagmus, it is said, the eyes in mines become dark-adapted so that fixation by the macula at the fovea is thrown out of its proper function and "the eyes are loosed from the control of central vision, and wandering movements easily arise." True, but then, why do they become regularly nystagmoid and not merely wandering? And how can that dark-adaption disorganise central vision when the eyes are again brought into light? And in view of the fact that in cases of leucomata, amblyopia and some other conditions, in which too the central vision is thrown out of function, when they have occurred later than the first few weeks of life, nystagmus does not take place; why then does it develop in the case of miners? Why do not the eyes go and remain quietly in any one place on one side as they do in cases of blindness, in which too there is neither any central vision or its control, or of some leucomata in which the central vision is covered? Obviously the central visual control over the muscles—though not the central vision itself—is a factor of doubtful existence and has little to do with the causation of nystagmus.

(E) In nervous diseases, what is the main feature of the lesions which cause nystagmus, and why do they, when existing in the brain, produce the nystagmoid movements in the eyes, though the nerve supply of the muscles of the eyes may be quite intact from its origins in the cortex to its distribution?

(F) And for the same reasons, why does labyrithine nystagmus occur?

(G) And why does defective formation of the skull and even, often, hydrocephalus cause nystagmus in the eyes?

These are some of the questions which I am attempting to answer in the light of the explanation which I have to offer about development of nystagmus. And as that explanation is based on the anatomical distribution of the structures concerned with the fixed or nystagmoid vision, and on the physiological functions of those structures, the relevant part only of

their anatomy and physiology may be briefly mentioned first, along with commentary on any such controversial points as may arise in connection with them.

The Relevant Anatomy

The choroid nourishes the pigment cells, the rods, the rod-fibres, the cones and the cone-fibres of the retina. The layer of pigment cells which are hexagonal, sometimes pentagonal, and closely packed, is placed between the choroid and the specialised nerve epithelium of the retina. The elongated processes of the pigment cells contain pigment and dip down between the rods and cones. The pigment consists of brown particles. The cells also secrete a pigment known as the visual purple, (very important in our discussion), which is present in the rods.

The rods and cones form the next layer in the retina. *The rods contain the rose coloured visual purple, secreted by the pigment cells, but not the cones.*

For descriptive purposes the retina is divided into its central and peripheral parts. The cones are the most numerous in the central part, and in the fovea centralis of the macula lutea, only the cones are found, while the rods are more numerous peripherally. In the immediate neighbourhood of the fovea centralis each cone is surrounded by a ring of rods. The number of such rings increases as the peripheral portions of the retina are reached. The outer segments of the cones are situated in a space which is filled with tissue fluid and the external limiting membrane keeps that fluid in place.

Edgridge-Green describes four depressions or canals, which lead into the larger depression of the external fovea. The canals appear to serve the function of conducting the visual purple to the fovea, which is the area of most acute vision. . *The cones which are present in the fovea have elongated outer segments which present a larger surface for photo-chemical stimulation.*

The rods and cones are connected by means of the rod-bipolar and cone-bipolar cells respectively to the nerve ganglion cells, the axons of which form the nerve fibres by means of which the impulses of sight are conducted to the brain. In the centre practically every cone has a separate nerve fibre for itself. But further and further peripherally one nerve fibre supplies more and more of rods and cones, until near the ora serrata hundreds of rods and several cones may be supplied by a single nerve fibre by means of the numerous dendrons of the ganglion cells. The nerve fibres of the retina constitute the optic nerve, in which the nerve fibres coming from the different parts of the retina are arranged regularly in definite situations, as they also are in the whole course of the nervous pathways until they reach the higher visual centres in their own definite situations in the occipital lobe.

Central or macular nerve fibres from the cells of the fovea comprise one third of the total number of the fibres of the optic nerve and come from the area of the direct and most distinct vision. In the nerve they lie in a triangular bundle, at first lateral to and a little below the other fibres, but later they come to occupy in it a central position. And as regards the other nerve fibres that come from the retina, those that are derived from its central parts enter the nerve at periphery, while the nerve fibres from the peripheral parts of the retina occupy the inner portions of the nerve.

At the chiasma the nerve fibres of the two optic nerves undergo partial decussation, the inner half of each of them going to the opposite side. But whether the inner half of the macular fibres also go to the opposite side has been denied by some observers, *e.g.*, according to Gordon Holmes' conclusions as described by Foster Moore, "The macula has not a bilateral representation." But proofs against such an assertion seem to be overwhelming. It seems that just like the fibres from the rest of the retina, the inner half of the macular fibres too, goes to the other side, while the outer half proceeds on the same side. That is supported by the observation of Wilfred Harris also, who has found that in temporary hemianopia, sometimes caused by migraine, the line dividing the affected from the unaffected part, passes right through the middle of the macula.

In the tract the macular fibres lie centrally and terminate in the lower visual centres. The optic tracts contain four sets of nerve fibres, namely, (1) direct temporal, (2) direct macular, (3) crossed macular and (4) crossed nasal.

The lower visual centres are three in number, namely:—

1. Lateral geniculate body, which receives 80% of the nerve fibres. 2. Superior colliculus, and 3. Pulvinar. 2 and 3 together receive the remaining 20% of the visual nerve fibres.

The higher visual centres are situated in the visual area, occupying the area striata on both the sides of the calcarine fissure of the occipital lobe. The macula is represented at the occipital poles. The other parts of the visual area represent the parts of similar location of the halves of the same side of both the retinae, that is the higher ones, the higher parts of the retinae and the lower, the lower parts and so on.

From the lower visual centres the visual nerve fibres go to the higher visual centres by optic radiations, in which the macular fibres occupy the central position. The other fibres represent the lateral half of the retina of the same side and medial half of that of the other side and occupy positions corresponding to the areas which they represent. And in the optic radiations some fibres from the external geniculate body go forwards and downwards and then sweep round backwards and pass through the temporal lobe on to the visual areas in the occipital cortex.

The Relevant Physiology

The relevant physiology for understanding nystagmus consists of the most popular theory of the production of the sense of sight. It is said it lacks confirmation, but that the examination of what occurs in the various types of nystagmus ought to suffice.

But in certain points of that theory I have to offer my own views.

When the rays of light impinge upon the retina, they produce a movement in the pigment cells whereby the melanin (fuscin) granules pass from the bodies of the pigment cells into those processes which lie between the outer portions of the rods. From these is produced the visual purple, a rose coloured substance, which exists in the outer portions of the rods. The light from the objects that are being seen forms a photograph and bleaches the visual purple in the rods. The photochemical decomposition of the visual purple stimulates the ends of the cones which produce the impulses of sight of the objects which are being seen and have produced their image on the retina.

Some authorities hold that the rods are not concerned with the conveyance of impulses to the brain and some say that the visual purple is probably concerned with the light of low intensity. Others believe that the rods are the chief agency of vision in twilight and are especially characterised by responsiveness to etherial vibrations of short wave lengths. They cite the instance of such animals as bats and owls, which have a twilight or dark adapted vision and in which rods with their visual purple are particularly abundant.

Fresh views and explanations advanced.—I uphold the view and shall make it clear that the rods are not concerned with the impulses of vision and further, I hold, the visual purple is concerned not only with the light of low intensity but every kind of visible light, howsoever strong or dim.

The sensation of every grade of light is conveyed by the cones only when they are stimulated by photochemical decomposition of the visual purple in contact with them. The "light adaptation" and "dark adaptation" of the eyes is determined by the stimulation chiefly of the different varieties of the cones that exist in different situations in the retina. The cones with elongated and broad-based outer segments, situated at the fovea, when supplied with abundant visual purple to cope with their size and capacity, are concerned with strong light. The strong light stimulates the necessary profuse flow of the visual purple that travels down the Edgridge-Green's four canals and fills the depression of the fovea centralis where it soaks the ends of those macular cones with as much tissue fluid as they would need for their requirements.

But when the light is dim, that is to say when the stimulation to the production of the visual purple is proportionately restricted, there is not enough of it to go flowing down to the fovea for the sake of the macular cones, and as they have no neighbouring rods filled with that fluid upon which they could draw in such circumstances, they are more or less thrown out of function, which is then taken up by the other cones at the periphery. These have short and thin outer segments and rings of rods around them and they can supply them with enough visual purple on the spot for their smaller capacity and needs. And the dim light present is quite sufficient to stimulate the whole host of the rods in those areas to yield that small amount of their visual purple that is needed for the few small cones functioning in their midst.

When the light falls upon the retina the cones become shortened and go and lie in close proximity to the external limiting membrane. That is quite suitable to the macular cones in bright light while the external limiting membrane holds the visual purple in position for them to soak in it in the foveal depression. In the dark, however, depending upon its degree, the fovea becomes more or less empty of the visual purple, while the cones extend towards the pigment cells and are so, as it were, thrown out of gear. But then the cones at the periphery, even with their smaller segments, are able to present enough surface to the visual purple provided by their surrounding rods, to enable them to serve the purpose of the dark adapted vision. As their short outer segments are firmly held by their surrounding rods, their restricted migration towards the pigment cells might actually help in elongating those segments a little and enabling them to present a larger surface to the visual purple.

The actual physiology of the light and dark adaptation—Bright light has a blinding effect on the peripheral short segmented cones, which in its presence become shorter still, while their surrounding rods begin to pour out their visual purple into the canals that flow into the foveal depression. Very strong and prolonged light can have a permanently blinding effect on all varieties of cones, as for instance in the cases of eclipse blindness, snow blindness, arc light blindness and the like. But in the case of ordinary bright light too, the peripheral cones are sufficiently affected to fail to see so well for a while when one goes from there into comparative dark. But on coming into light from dark, no time is taken to see things by the macular cones clearly. On the contrary, owing to the extra accumulation of the visual purple which the fovea had a chance to collect without spending much in the dark, the brightness appears stronger for a while, when one comes into light from the dark. And so as to save the weak and small, peripheral cones from inordinate exposure to the bright light in which their function is not so important, the pupil contracts and shuts the light as much from them as necessary and so the eye becomes "light adapted." But in the dark the pupil dilates and lets in as much light as may be necessary to stimulate the requisite production of the visual purple. And thus the eye is made "dark adapted."

The instance of owls and bats must also support this view for the simple reason that though the rods are plentiful in their retinae, the cones are not altogether absent. The animal, which has not got any cones, will never be able to see in any conditions whatever the number of rods which his retina may possess. But logically it ought not to have any rods either, because their being no cones to be supplied with the visual purple, the necessity of the rods which produce it should not arise. The rod-bipolar cells, with which the rods are connected with the ganglion cells ,have only to convey to the rods the impulse to produce the necessary amount of visual purple in given conditions.

A fuller experiment with a dim star—The instance of a dim star is often cited as a proof of the specialisation of the rods at the periphery around the macula for the vision of dim lights. But if one observes closely, he will find that when one begins to look at a point in the neighbourhood of such a dim star so as to bring its image to fall near the macula but not upon itself, although it looks brighter for a little while, it soon begins to fade and then goes out of sight altogether. At that moment there will be a conscious though involuntary effort on the part of the eye to make a nystagmoid movement so as to change its position and prevent the disappearance of the star by presenting to its image another neighbouring area. But if the eye is fixed firmly in the same position and kept looking at the same imaginary point in the neighbourhood of the star, it will disappear, sure enough. And then, while the eye is still kept in that position, the star will appear again, but not so brightly as before, and then again disappear. There being no constantly replenished foveal fountain of visual purple around the cones at the periphery which are now concerned with the dim light of that star, the visual purple of the surrounding rods is soon exhausted and then takes a little time to come in smaller and smaller quantities again, which again are soon exhausted, and that explains the whole phenomenon. At the fovea itself, the necessary supply of the visual purple for seeing that star clearly cannot be maintained owing to its deficient production on account of the weak stimulation of the dim light present. The experiment is best performed with one eye screened and the star selected must be very dim, for, it will fail if the star has enough brightness to maintain a constant production of the visual purple at the spot where its image is falling.

Visual purple in pathological conditions—In pigmentary degeneration of the retina, siderosis and like diseases, in which the periphery of the retina along with its cones and pigment cells has undergone disintegration, nyctalopia occurs for the reason that melanin granules are no longer available in the pigment cells and so no visual purple can be formed out of them. In nyctalopia associated with xerophthalmia too, the visual purple is at fault.

Explanations Advanced

After the discussion of the anatomy and physiology concerned, the genesis of nystagmus is easily explained. And it provides answers to the main questions as well as the others raised.

When owing to any cause the central vision is thrown out of function and one has to depend on the peripheral cones for vision in a stronger light than is physiologically suited to them, the most natural consequences immediately follow. The eyes are turned to one side and a few cones at the periphery try to catch the image first. The visual purple around them is soon exhausted. And their own safety too makes it expedient that they do not keep directed to that light longer than momentarily. But then so as to maintain the vision of the object that is being looked at, the eyes have to turn a little so as to bring the next neighbourhood of the cones in position to catch the image. The same result takes place there also and the eyes have to turn a little further still in order to bring the yet next batch of cones into action. That goes on until the farthest limit in the other direction has been reached and then the eyes jump back to their starting point, which by now has accumulated sufficient visual purple to enable them to see again. They could not have gone back equally slowly or returned from anywhere in the middle of their journey, because the area whose visual purple they had just exhausted could not have been replenished with sufficient amount of it for the purpose of vision so soon. But still those areas have had enough of it even in that short time to maintain the vision unbroken during the quick return journey of the eyes. And if a close observation is made of that return journey, it would be found that its commencement is more rapid than its termination, though that too has to be expedited in order to ensure sufficiency of the visual purple for the next forward journey. Thus in nystagmus there is always a comparatively slow movement to one side and a quicker return. There is no question in it of "quick movement with a slower return" at any time, unless one begins his description at the wrong end in the order of the events as they actually take place.

But even if it were to be held that the twilight or dark-adapted vision is effected not by the peripheral, short segmented cones, but by the rods, the explanation of the genesis of nystagmus given above will still hold good. When the central vision has been thrown out of function, the eyes have to see by means of the peripheral parts of the retinae, which have only a local and limited supply of the visual purple which soon becomes exhausted by bright light. And the only way to cope with that situation lies in exposing different parts of the retina by turn to that light, which can only be achieved by nystagmoid movements that the eyes begin to make involuntarily.

How Different Varieties of Nystagmus are Developed

When conditions for development of nystagmus are created, if the eyes are free to move in all directions with equal advantage, the nystagmus produced would be circumductory and of more or less uniform movement—that is to say no slow movement and quick return in that case. And that is what often actually occurs in the case of the newborn when they develop the disease while still lying quietly on their backs and looking in the direction of the ceiling. But when all the movements are to some extent restricted, rotatory nystagmus should take place. When upper and lower movements are held in check, as for instance in the case of miners, the eyes will have to move horizontally, but in the case of restriction of lateral movements, the nystagmus would be vertical. And the other varieties of nystagmus also would be determined by limitations of similar nature.

And so it will be seen that there is also no question that "the eyes are loosed from the control of central

vision and wandering movements easily arise." The muscles of eye movements are under the control of the central nervous system, but not of central or peripheral vision. And according to the conditions that prevail, the central nervous system uses them for adequate movements in central or peripheral vision in a voluntary or involuntary manner.

Causes and Sites of Lesions

And so the main causes of nystagmus are such nervous, mechanical or degenerative changes as affect the central vision or particularly a light adapted eye. In nervous affections the lesion may lie anywhere in the central visual pathways, from the macula up to the higher centres. If the lesion occurs on one side only and is placed anterior to the chiasma, monocular nystagmus would be produced on the same side and become particularly marked when the other eye is closed. Behind the decussation of the visual nervous fibres at the chiasma, a lesion would not cause any nystagmus if it occurs on one side only. If it occurs on both the sides and interferes with central vision of both, or if it is placed on the chiasma itself affecting the macular fibres of both the optic nerves, binocular nystagmus would be caused.

By mechanical causes are meant the conditions in which the macula is shifted from its natural position by the turning away of both the eyes and becoming settled in that abnormal condition. Then if by a little turn, tilt or bend of the head, it could be brought to a nomal position with regard to the object that is being looked at that time, nystagmus can be made to disappear. But if the head is turned in the opposite direction, it will become more accentuated. An artificial type of temporary nystagmus can be mechanically produced by some by turning the eyes to one side to the farthest limit and holding them there.

And degenerative changes relate to those conditions of the retina, in which the pigment cells containing melanin granules, or the rods which produce visual purple from those granules, or the cones which utilise the visual purple for the purpose of vision are so affected that either the visual purple cannot be produced or cannot be utilised for central vision.

The Points Cleared

In view of the foregoing explanations, the questions raised at the beginning of this discussion can now be satisfactorily answered:—

(A) In hereditary nystagmus, on account of partial or complete albinism, there is deficiency of pigment cells, and so less of melanin granules, and consequently less production of the visual purple. The foveal depression is constantly empty and so the macular cones cannot function. The eyes have to depend for sight on the peripheral cones for which there is hardly enough visual purple around them for the nystagmoid, indistinct vision, which is all that they can provide.

(B) In voluntary nystagmus an effort has to be successfully made to turn the eyes so far to one side as to stop seeing with the macula and make only the periphery of the retina perform the function of vision.

(C) In bilateral visual defect of early life, the development of central vision is interfered with. That is generally caused by the darkness of ill-lit rooms, in which there is not enough light to stimulate the full development of the macula in the first six weeks of life. And so the peripheral cones have to be utilised for vision and nystagmus naturally takes place. In any form of nystagmus, except circumductory or rotatory, the eyes would be found to be turned slightly downwards, upwards or one eye laterally and the other medially so as to escape the macular region in the nystagmoid movement of the eyes. And in the bilateral visual defect of early life, it need not be supposed that there is any lack of co-ordination of the muscles. The muscles move the eyes quite regularly in their nystagmoid movements and the muscle tests on the intrinsic as well as extrinsic muscles disprove that hypothesis.

And posterior uveitis causes nystagmus by disintegrating the pigment cells so that they cannot provide enough melanin granules for production of sufficient quantity of the visual purple for the requirements of central vision at the fovea centralis.

(D) In occupational (miner's) nystagmus, the eyes are raised during work very high and mostly to one or the other side and held in that position for so long that the muscles and the nerves concerned become overworked and exhausted and develop a neurasthenic condition. They cannot then hold the eyes in normal position and those droop downwards. The macula is thus turned upwards from its natural position, while the front view is managed by the lower cones which are now in position for catching it. Nystagmus follows. If, however, objects in lower situations are being seen for which the macula is in correct position, or if the head is tilted backwards so as to bring the macula mechanically in position for catching the front view, nystagmus can be lessened or even made to disappear. But when at attempt is made to look upwards or see things higher up, it fails in its completion on account of the local neurasthenia and the macula is thrown still further from the object in view. Still more peripheral cones situated wider apart and having still smaller outer segments, are brought into action and nystagmus increases. Rest and rehabilitation of the elevator muscles and nerves should put that condition right and actually many sufferers get well after they have given up their occupation for some time.

Another factor which may also be playing some part in the development of miner's nystagmus consists of the fact that in the dark surroundings in which the miners have to work, there is no stimulation for the production of the visual purple for Edgridge-Green canals or the fovea centralis. They are free late in the evening and during the night again, there is no such stimulus. The next morning they are in the pits again very early and the same conditions prevail. Thus the rods, which produce copious quantities of

visual purple in bright light for the canals and the fovea and the macular cones, which utilise it in the same light are rendered inactive for very prolonged periods and undergo a varying amount of disuse atrophy. Hence their inability to exercise central vision afterwards and the development of nystagmus. If arrangements could be made by suitable shifts to let the miners work one day in the dark and another in normal light alternately, occupational nystagmus might disappear.

(E) The main feature of the nervous diseases which cause nystagmus consists of such lesions as interfere with the central vision. Their likely sites and the results which they produce at those have already been discussed and explained.

(F) In labyrinthine nystagmus, it is difficult for me to make out exactly the nature of the damage and I wish some neurologist, with a more intimate knowledge of the interconnections involved, would come forward and explain. But most probably the lesion blocks the central visual pathways on both sides between the lower and higher visual centres, most likely where the optic radiations having swept downwards and forwards, begin to go backwards. Or possibly, labyrinthine disease may be affecting the equilibrium of the eyes to begin with and making it difficult for them to maintain the macula in its normal position, and they may be trying to overcome the condition created by a recourse to nystagmoid movements. Or, it may be nature's safeguard against the loss by the sufferer of his own equilibrium. In tabes, we know, when the optic nerve undergoes atrophy, the spastic gait of paralysis agitans generally does not occur, whereas in the development of the latter the optic nerve often escapes.

(G)) Defective formation of the skull and hydrocephalus either by pressure or owing to maldevelopment, would be dislodging in some cases the macula from its normal position and thus becoming the cause of nystagmus.

REFERENCES

FOSTER MOORE, R.—*Medical Ophthalmology.*
LYLE, H. W.—*Physiology.*
SCOTT, R. S.—*Notes by D.O.M.S. (London) Students,* 1927.

(Continued from page 253)

problem and for critical analysis and guidance in preparing the paper.

REFERENCES

BOSE, B. C., DUTTA, N. K. and MUKERJI, B.—*Current Science,* **2**:435, 1942.
CHOWDHURI, B. N. AND MUKERJI, B.—*Indian M. Gaz.,* in the Press.
General Medical Council of United Kingdom, London, Fourth Addendum to B.P. 1932: 16, 1941.
General Medical Council of United Kingdom, London, Sixth Addendum to B.P. 1932: 10, 1943.
MUKERJI, B. AND DUTTA, N. K.—*Proc. Indian Sci. Cong.* Pt. III, Sec. XII, 235, 1942.
MUNCH, J. C. AND DECKERT, W. A.—*J. Am. Pharm. A.,* **19**: 354-356, 1930.
WOOLFE, G.—*Quart. J. Pharm. & Pharmacol.,* **14**:49-55, 1941*a*. *Idem*—*Ibid.,* **14**:56-63, 1941*b*.

HYGIENE PUBLICITY AND HEALTH EDUCATION

INDRA NARAIN SAXENA, L.M.P., L.P.H.,
Formerly School Medical Officer, Fatehgarh, U. P.

INTRODUCTION

By the term health education is meant the imparting of information to the general public on matters concerning health and sanitation and includes all health activities whether they are carried out in schools or outside schools. Thus the health education is anything which educates any one in matters of health.

The importance of health education in the campaign of improved national health has been recognised by both the educational and the health authorities and the annual celebrations of health weeks and exhibitions organised in urban and rural areas have been encouraged by the Education and Public Health Departments and the Red Cross Society as a means of focussing public attention on question of health. We have to bring home to the public the necessity of giving up hide-bound insanitary customs and to appreciate and put into practice sanitary ideals and principles. We want them to realise the full value and significance of the public health activities to be convinced that our work is a national service, to comprehend that our aim and endeavour is to build up a healthy race, a healthy nation, a nation with a sound mind in a sound body, a nation fit to take its proper stand in the arena of Nations. Every one has to throw his weight in the scale if we are to achieve success. In order to bring forth fruits of the best quality we have to tend this plant of sanitation and hygiene tenderly, patiently and systematically over a number of years. The aim of education for health is the healthy man, the man physically and mentally well-balanced who knows and perceives what is beneficial for him. In short it seeks to teach the individual to value life, not to throw it away but to regard it as sacred trust. This end can be achieved by changing the behaviour of individual or in other words by his sanitary conscience or making him health-minded through a scientific and well-planned programme of health education. It is by no means an easy problem in the country where the matter is complicated by the fact as the bulk of population lives in villages without proper means of communication and is illiterate with old ideas and prejudices ingrained in their minds. Their age-long customs and habits can only be changed by continued efforts of the public health workers in the province, who are engaged in the task of health education of the people. The apathetic attitude of the public and indifference of the authorities may have been a great discouragement to many of us, but none can deny the fact that it is the most important means of improving national health and modern methods of propaganda as far as available should be utilised.

The word propaganda or publicity has a sinister meaning as it is suggestive of self-advertisement or self-advancement and by this is meant the propagation of a group of vested interest.

In my opinion, the kind of publicity we should give to hygiene and sanitation is through educational means and to arouse and to develop the consciousness of the public and the individuals to the reality of unseen germs and risks, to personal and public health, that lurk in every day life. To this end many ways are adopted by public health workers. Hygiene publicity has a great part to play in the conservation of the health of the people. It should precede, accompany and follow all forms of public health endeavours, legislative, educational and economic, to ensure maximum and the smooth and efficient working of the public health administration machinery. Health work in the opinion of those who have been in touch with the public for long is after all health education. Hygiene publicity like other types of propaganda is a science for the mastery of which talent, efforts and experience are necessary in no small amount. The phenomenal success of certain proprietary medicines which command an extensive sale are no doubt due to the effective propaganda carried out by the manufacturers. The powers of publicity are fully realised when one finds out for himself that the prescriptions of most of such preparations have nothing original or extraordinary in them. It is the publicity that explains their popularity and effectiveness. Thus it will appear that great indeed is the power of propaganda. They say that it can move even mountains. Propaganda can give life, make war or peace and bring salvation or destruction to humanity.

Classification

For the sake of convenience the Hygiene Publicity and propaganda work can be divided into (1) rural and (2) urban. This should further be dealt with in 2 classes, adult and juvenile each requiring its special method of approach and treatment and involving problem of publicity and propaganda. In the former I mean the public health training and health instructions for the general public and in the latter, the health education work in the schools. It is with this last phase of health education, that I will chiefly deal with in this paper. It is not possible to cover all the scientific modern methods of health education and propaganda nor it is my object to do so. I will however attempt to put before you for discussion some of the agencies and practical methods of health education utilized and adopted in imparting this knowledge to the scholastic staff and students in different schools in the province and what modifications or suggestions if any are necessary to suit our local requirements. Publicity work is much more successfully done among the young and the ignorant. Young minds are like clean slates. They are much more receptive and amenable to persuasion. Older people are much more conservative and dislike change. Finding it difficult to give up age old views and beliefs, they seek shelter under fatalistic theories.

Creation of Habits

Human nature being what it is, our first effort should be directed to the creation of habit. We may begin with the young as the youthful mind is more easily moulded. Hygiene should be a compulsory subject not only in English Schools from 3rd to 10th standards but it should be introduced in vernacular middle and primary schools of both boys and girls. The present day hygiene teaching in English schools is confined from class V to VIII and certain books prescribed for the different classes contain such lessons which cannot be assimilated by the boys. The subject of hygiene although compulsory in these classes, is given no impetus and importance as in some schools last period once or twice a week in the school time table is fixed for teaching hygiene. The scholars get the impression that the subject of hygiene is not at all important with the result that this subject is generally neglected. Parents constantly neglect to teach their children, that the daily regular action of the bowels is a necessity for health and that absolute regularity can only be ensured by keeping to the same hour each day. Teachers should instil this thoroughly into the minds of the children and explain that to allow refuse to accumulate inside the body will poison the whole system.

To enable the teachers to train the students under their charge, they should be given a thorough training more particularly in the practical aspect of the subject. Daily cleanliness, weekly nail-cutting, and tooth cleansing parades, must be held and practical aspects of personal cleanliness should be explained to the scholars. The boys with dirty bodies and teeth should be made to fall out. There should be a bathing place in each school. When I was at Jhansi and Fyzabad, I had introduced a bathing and washing scheme in municipal board primary schools and the municipal boards were requested to sanction some money for the supply of soap, towels, water buckets, hair combs and neem dantoon sticks for free use by the dirty boys who were picked out at the morning prayer time of the school. At Jhansi where the water supply was scanty during the time I was there, the Education Superintendent had asked the school teachers to take the boys to the bathing ghats situated near by. There was a proposal to construct bathing platforms with a dozen water taps for such dirty boys at a central place. The boys should be given thorough wash. Each boy was supplied with a separate piece of khaddar cloth and a soap cake. This scheme worked very well both at Jhansi and Fyzabad and went a long way to improve the general cleanliness of the body and clothes of the scholars. The most neat and clean boys at the time of monthly inspection by the headmaster and school health officer were given marks which were added at the end of each quarter and some rewards were given. I would strongly suggest that this is the only practical way of not only improving the general personal cleanliness of habitually dirty and filthy boys, but it goes a long way to inculcate on their minds the importance of cleanliness. The teaching of hygiene should be illustrated with posters, generally available from the Red Cross depot and present books on hygiene should be revised so that 3 standards of teaching on hygiene may be included therein. First standard for primary classes upto 3rd, second standard for classes 4th and 5th and

the 3rd standard for 6th, 7th and 8th classes. Practical demonstrations should be given after the theoretical teaching. Periodical competitions between the various classes and inter-schools competitions should be held. Prizes for essays should be given, excursions arranged and students taken to see the various activities of the public health department, for as we know, "things seen are mightier than things heard." In order to fire the mind of the youth, we should weave into the lives of some heroes, events that would bring out into relief the practice of sanitary principles. Dramas, songs and poems may be composed touching upon those ideals. A sense of fellow feeling and charity should be imbued into them so that when the time comes and they become city fathers, they may be able to enforce sanitary principles and by their persuasion and more so by their example they may bring other people to their way of thinking and living. We must remember that it is a slow process, an uphill job, and that only several years' regular practice may bring about some improvement.

The juvenile class or health education in schools should be the most important item of activities of the hygiene publicity department and must form a vital element in the general scheme of education. Such a programme should be planned to bring to the students and teachers the increasing knowledge of principles of personal and community hygiene which they need to apply in daily living as individuals and as a group for the attainment of maximum health and efficiency.

Agencies for Hygiene Publicity and Health Education—In such a programme all available resources should be utilised for disseminating knowledge through suitable agencies and means at our disposal. In so doing we must keep the following conditions in mind.

(1) Only such facts should be put up before the students and teachers as have been established on a sound scientific basis.

(2) The facts must be presented with the most effective technic so as to make the essential facts clear and arouse an effective desire to apply them.

(3) It must be so planned as to emphasise those things which are vitally important.

(4) It should be in the language easily understood by them. The high flown language is out of their reach and appears Greek to them, whether it be radio, cinema, magic lantern speech, posters, leaflets or lectures.

In order to achieve the above objective, one requires specially trained personnel. It is chiefly for this reason that a separate scheme of School Health Service has been organised in these provinces. If we look, at the medical inspection work in schools, it is more a propaganda than anything else. A very prevalent notion is that medical inspection without proper treatment of the diseases discovered at the medical examination is a huge waste of time. The idea of medical inspection is so much amalgamated with that of the treatment that the former without the latter is only a farce and eyewash. One of the scheduled duties of the school health officers is the imparting of health education, and I consider that this is the most suitable agency which can carry out the health education work in schools to the best advantage and their services should profitably be utilised for this purpose. The success of any health education campaign rests with zeal and interest with which the school health officer propagates the same and the interest taken by teachers is directly proportionate to the interest taken by the school health officer who works from day to day among the scholars and gets opportunity to study the nature and habits of the students.

The school health officer is therefore the first most important agency for supplying the necessary material for carrying on this work.

The other agency for health education work is the teacher. The school teacher specially in villages is the most literate man. Through him the school boy can be given health education. This requires, the teachers of the vernacular schools to have some knowledge of public health subjects. The teacher of to-day is now much better equipped in this respect than a few years back, as they mostly are taught something of hygiene and public health in their training colleges and normal schools. But in my opinion this is not enough. They need more practical training and frequent refresher courses in groups to inspire them to work with the right ideal and to be acquainted with such facts about which knowledge is to be imparted. The teacher should take out bigger boys to different places in the company of the health officer and the scholars should be able to tell the defects they find and means to remove them, should be explained to them. The real centre of this ignorance and wrong attitude is the home and it is there where it can most successfully be tackled. Over and over again headmasters and teachers have said in a tone of hopelessness that in all their attempts to improve the health of and arouse social civic sense in their boys, meets with no response or cooperation from the parents. All they care for is that their sons should be promoted and bring all possible pressure on the headmaster for this purpose. There is a great deal of truth in this and when it is combined with the lack of enthusiasm of the teachers themselves, it becomes almost a hopeless task. Still we must make an effort. In Fyzabad and Jhansi it has been my practice to follow up the medical examination of the school boys by visiting the homes of some of those to whom vouchers were issued and talking with the fathers about the defects found in their wards. This gave me an approach to the homes and a means of gaining their friendship. The next step would be to utilise these visits for a friendly chat on citizenship and make concrete suggestions relating to the actual surrounding. This is not always possible even for the school health officer or ex-officio medical officers of schools, but I think we can harness the energy and enthusiasm of boy scouts, junior Red Cross members and members of the cadet divisions. An attempt may be made to form an association of the parents and teachers on the one hand and student's welfare committee on the other hand to supplement the recom-

mendations of the parents and teachers association. Education for healthy habits is more important than the knowledge of hygiene. The formation of health habits can be affected by the parents in the first 5 years of childhood as the German proverb rightly says "What the little Jackie does not learn, adult Jack can never learn." In the various adult schools the subject of Home Nursing should be taught. In my opinion we will get more encouraging response from the girl schools. Perhaps the best approach to the homes we possess is in the midwives and health visitors and doctors of maternity and child welfare centres. The best we can do and should do is to try and arouse the latent enthusiasm and patriotism of the maternity staff and tell them how to educate the mothers on civic sense related to the actual surroundings. For the hygiene propaganda work, specially trained nurses should be employed and they should pay visit to homes and explain the defects from which their children are suffering to the mothers and how to remedy them. The co-operation of others can be usefully secured in pushing on our publicity programme. Sometimes a teacher does his best to have every body in his school inoculated in the hope that he himself may be left out by reason of his special endeavours, similarly people will extend their cooperation with selfish considerations some for award of honours, some in the hope of receiving financial contributions and some for no better reasons than to show to others that they are on friendly terms with big Government officials. All of us may not agree to exploiting such tendencies, but there is no doubt that a clever propagandist could utlise them to his advantage.

The agency of private organisations like Junior Red Cross, Boy Scouts, School Health League and St. John Ambulance Association should be fully availed of in propagating the health education. While making school medical inspection or taking spleen census, if short talks on health are given it not only enlivens the whole procedure, but useful hints about personal hygiene can be thrown out.

Methods of Publicity

Of the two methods, intensive and extensive—there are very little opportunities of intensive health education which is most effective method of health education due to heavy curricular and extra-curricular activities in schools and reluctance on the part of school staff.

Our efforts have mainly been directed on an ordinary routine scale and it is possibly for this reason that results achieved so far have not been very encouraging. In the Partabgarh Health Unit where the area is limited and the staff is sufficient, an intensive type of health education not only to the school children but to the public is possible. The large maternity staff there is useful in carrying the message of health to the women in the homes. We should in our programme of health education pay more attention towards intensive methods of health education. Of these one of the chief means is the spoken words. These should include

1. Lectures on health subjects by teachers and school health officers.
2. Lectures illustrated by magic lantern, cinema films and posters.
3. Lectures arranged in schools from big personalities and high officials of the public health department and educationists.

Since the last 2 decades magic lantern lectures are being used for giving lectures as a routine measure in schools. I am inclined to think that it is now an old fashioned means of publicity which does not arouse much interest in the audience, specially in the urban schools. The type of magic lantern provided are bulky for transport to rural schools. The stories of the slides are much repeated ones and have no charm now for the listeners. It is desirable to change the stories in some other forms and the subject matter should be put up in more attractive language. It should be supplemented by other modern methods of publicity.

We must not forget spoken words from individual to individual and should see that there should be more educational work by the medical officers and private practitioners treating the sick scholars in hostels and at home as an old medical sage says "You can cure a man by remedy and by word." People are more receptive in times of illness or epidemic to the teachings of preventive medicines and hygiene than they are under normal conditions. The school health officers and treating physicians should regard such occasions as psychologically most favourable for the spread of useful information either verbally or by printed material. The attending physician carries a good deal of influence and information either verbally or by printed material from him is authoritative, personal and direct. The school health authorities should always try to seek the help of this effective agency in his programme of health education.

Broadcasting is now another new valuable means of propaganda and several radio talks have been given by the experts during the past years. This method is capable of commanding a large audience than any other means of propaganda. The wireless sets should be installed if funds permit in all the Intermediate colleges and high schools and biweekly health talk should be broadcast. I have a great faith in radio and loudspeakers which should be brought into service on a large scale.

The second means of health education is printed words. The Red Cross and Hygiene Publicity Bureau have brought out a dozen sets of posters on common infectious diseases, school hygiene and sanitation. Their efficiency to a great extent depends on how they are being placed. They are meant for exhibitions and should be made use of by school teachers and health officers in giving lectures. There are pamphlets booklets and leaflets on different health subjects which should be widely distributed free in schools and colleges. Printed literature is not believed by many to be a very effective method of health education, but it is necessary when other more modern means are not within the easy reach. We must however keep

in mind their intelligent distribution. They should be given to boys who can read and understand them. Attractive posters of permanent type should be put up in all class rooms and hostel dormitories.

Hand bills although cheap are often wasteful. Health magazines should be supplied in each school library. Articles should be contributed frequently in the school magazines, issued by school teachers and students representatives. This may not only be helpful in the spread of knowledge to the students and teachers, but also serves as a ground for exchange of ideas on preventive measures and special health activities going on in particular schools. Appropriate slogans should be got up and posted prominently to arrest the attention of the students.

Motion Pictures—Nothing can compare with motion-pictures for arresting the attention of the audience in a class room or lecture hall and creating an interest in the subject taught. Teachers and lecturers everywhere recognise that visual presentation of a subject facilitates understanding and is by far the most effective method of instructions. The cinema can be used to rebuild India in common sense and elementary knowledge of hygiene, food values, the art of living and that it would be a wonderful apparatus for the liquidation of adult illiteracy. Night schools are no use for a half-starved peasantry which is too tired to come willingly out of its huts to learn 3 rupees, but it will come out most gladly to watch a film. Thus it will apear that motion pictures are a dynamic factor in enriching, intensifying and reinforcing the major activities of the health programme. The cinematograph film has been rightly claimed as the greatest invention since the introduction of printing and it is certainly the most powerful and convincing medium for the diffusion of knowledge and ideas. Nothing can be so effective and memorable in teaching than a good instructive film. The Hygiene Publicity Bureau, U.P., possesses more than 2 dozen of films on different subjects of health and sanitation for doing propaganda on occasions of fairs, exhibitions and other big gatherings. In these days of progress it is in the human nature to be more attracted by the more modern form of propaganda and if talkie films are not possible at least silent films should be extensively used for propaganda purposes. To meet this growing demand for movie-pictures the best scheme would be to supply a 16 mm. projector to each school health officer and sufficient number of 16 mm. films to suit the local requirements should be provided. Literature reaches only to the educated classes, whereas motion pictures carry universal message and therefore works as a plastic surgery on the human mind.

If the pen is mightier than the sword, the film should dominate them both. Hitler believes that propaganda must always be ahead of organisation to win over the human material with which organisation is to work. Hitler owes his rise to the highest position in Germany in his propagandist abilities. Every body who reads the newspaper carefully must be aware of the extent to which time, attention and funds are being devoted these days to propaganda.

Health Weeks and Health Exhibition—These have attracted a good deal of attention as a means of health education. There is a rising desire to organise health week and health exhibitions and it is almost an annual feature in some of the districts. Success depends on the attractiveness in a practical way of the health week programme and various exhibits and literature pertaining to public health, sanitation and personal health. These are of great help in creating a demand for something which ordinarily does not arouse any particular longing. I have a personal experience of the utility of the health week celebrations which I have organised in schools every year since 1932. I have found that the organisation of Health Day or Health Weeks is very necessary in schools as it will give impetus to the school health work, besides giving health education. In my programme of health week celebrations, I used to include all interesting activities of various nature—Indian exercises like *kabbadi*, tug of war, *lazim*, *lathi* play, *danda*, *banathi*, wrestling and *mudgar* dumb-bell exercises were also included to enliven the programme. I had secured the co-operation of municipal board, deputy inspector of schools, education supdt., inspector of schools and the heads of institutions. The important activities in health week are the inspection of the physical development and personal cleanliness of body, hands, nails, hair, teeth, dress and books etc., and awarding of prizes for the best developed and most neat and clean scholars. The boys prepare, posters, model, charts, mottos, albums with the help of teachers and decorate their schools and class rooms. The most neat and clean class rooms used to get the prize of a wooden shield to be competed every year. In each school a health museum was opened and all these posters, models and albums prepared by the boys used to be kept there. A series of useful lectures on different topics of health subjects, physical culture, nutrition and contagious diseases are delivered by the eminent medical men and educationists in the city. Students' processions, big rallies and mass meetings in the school compound and Town Halls were also organised and addressed by the big leaders of the localities. The boys parade the mohallas and streets with posters in their hands and sing songs on health and hygiene and thus attract the attention of the public. A huge crowd used to gather round such processions and *prabhat pherries* and was pleased to hear the interesting and instructive songs. In my opinion this is the best form of health education in schools. The concentrated efforts on health and sanitation once a year confined to one week help the school boys in matters of health. The boys stage health dramas, dialogues, songs on health and a competition was held to award prizes. They were also required to write essays and compose dramas on health and hygiene. A final competition in all these health events is held annually and prize-giving ceremony is also organised on a large scale. The guardians and general public are invited to this function in order to secure their good will, co-operation and sympathies. I was able to secure about a dozen trophies for award to schools in connection with health week celebrations from well-to-do people of the districts. They were awarded every year in the inter-

school competitions, and thus there was a great encouragement. Along with these activities an exhibition was also arranged at a central place in the city where all the models, posters and albums are attractively arranged for the students of all the schools and the general public. I have found the celebration of Health Week in schools very interesting and useful. A sense of cleanliness and dignity of manual labour was inculcated among the scholars who clean their class rooms, the desks, chairs, stools and in fact all the furniture and school compound with their hands.

Junior Red Cross & School Health League—Health education of the children has been undertaken through the agency of the Junior Red Cross whose object is to promote health by formation of good health habits amongst the members of the groups. Many juniors in this province who are the members of the Junior Red Cross and Health League in schools, are not only laying sound foundation for the future generation, but also spreading their examples to their conservative parents in leading healthy life. The Counsellors of the Groups —the school teachers, have splendid opportunities to show the talents by engaging their boys in anti-malarial, anti-epidemic and health education work. School teachers and boys can give lot of help if properly approached. On addressing a Junior Red Cross group and Health League the teachers and counsellors can explain to the junior members the preventive measures against epidemic diseases and other aspects of hygiene publicity.

Contests and Competitions—These also help a good deal as a means of encouraging health education. The St. John Ambulances Association and its Brigade and Cadet Division's activities also come within the programme of health education in the provinces. The chief activities of this Association are the training and qualifying people in courses of first-aid, home nursing hygiene and sanitation and Mackenzie School Course and the annual provincial and circle competitions have given a great impetus to this movement. In many districts such competitions have also become an annual feature.

It will have to be admitted that in public health work both the methods of persuasion and compulsion have their role to play. There are certain customs and practices which are injurious to public health and which are tolerated in the name of personal and religious liberties which should be abolished by legislative enactments, and the so-called liberties of individuals curtailed in the interest of public health, but in a democratic country like ours, it should be realised that the public health legislation should not be much in advance to public opinion or the sentiments of the people as it is likely to defeat its object, if intelligent co-operation of the public is not forthcoming in its enforcement. All opposition and resentment on the part of the individual are to be guarded against. Arguments will only take us farther from the point. The individual is not to feel bored or to get the impression that we are dealing with him really in our own interests. He may be a mere village school teacher, but he is to be suitably treated and listened to if his co-operation and goodwill are to be secured. Appreciation and encouragement which are but other names for flattery, prompt such persons to renewed efforts in the same direction. Criticism is worse than useless. It will arouse resentment. Talking lightly of any body's views and beliefs will only estrange him when what we desire is to arouse in him an eager want. Far from being prejudiced against us, he is to become friendly towards us. A sympathetic attitude, a well-developed sense of humour and a missionary spirit will be additional attributes. In the case of most of us pecuniary motives are quite strong. Promise of a small contribution to those who have been sitting tight over their hoardings will act to open their purse strings since the temptation to secure the contribution may prove quite strong. Some students will take care of their teeth only because they hate footing the big bills of a dentist. I had introduced at Fyzabad a Students Welfare Committee and spectacles and dental treatment were freely provided. Many guardians and students in the beginning were opposed to the using of the glasses or cleaning of their teeth by any dentist or getting the dental cavities filled up. The students committee offered quarter to half of the cost of dental treatment and spectacles to those who were willing to provide the rest of the cost. A large number of students who were really suffering from defective vision and bad teeth, came forward to have the requisite treatment. A stout flabby student may take to exercise to reduce his weight, a lean man to develop his muscles, a youth to shine off in the eyes of others, and a girl to have the body beautiful if persuasive methods are adopted. Envy and emulation may also act as motives. The sight of a gymnasium or a peep at people engaged in exercises, games, and recreation induces or reminds us to devote some time to exercise.

Conclusion

The above are some of the important means of health education that should be carried in schools. In every civilised country health education has played a great part in nation-building but it has taken several decades to do so. There is no quick or royal road to reach our goal. We have to plod on patiently and courageously using both persuasive tactics and sterner measures as the occasion demands with tact, sympathy and forbearance. We must be prepared for set-backs but like a true warrior, we must carry on the fight and gain ground inch by inch, if need be. Our average school boy has now more knowledge of common infectious diseases and health habits than a boy of a decade back. Every year increasing number of scholars and teachers are surrendering to vaccination and inoculation. Publicity and propaganda only pave the way and do nothing more. It draws attention to the subject which need thought. No lasting results can be obtained by using force or coercion. Persuasion should therefore be the method of choice in all public health work.

JOURNAL OF THE

INDIAN MEDICAL ASSOCIATION

CALCUTTA, MAY, 1946

D. D. T.

During the last World War II, science has made two most outstanding discoveries. They are penicillin and D.D.T. Penicillin is known to the medical profession in India and many of us have used this valuable drug by now. D.D.T. is little known. But from the point of public health, it looks that this organic chemical may bring revolution in the domain of public health. It may be mentioned here that while penicillin is curative, D.D.T. is preventive. Penicillin is a drug which can only be bought and used by the rich of our country. D.D.T. is a drug for the community both rich and poor. D.D.T. has got to be used by the state for public health while Penicillin is procured by the individual. Although entirely dissimilar in their action, properties and utility, the above comparison is worth while.

D.D.T. is an abbreviation of an organic chemical called dichloro-diphenyl-trichloroethane. This substance was discovered by a German chemist from Strassburg in 1874. In 1940 J. R. Geigy Company of Switzerland ran into this compound and discovered its properties as a good insecticide for dairy and stable flies. The Swiss company marketed it under the trade name Gesaral. During the War, the Department of Agriculture officials at Washington D.C. procured a sample of the chemical and the Orlando Laboratory carried out researches to find out its properties. It is claimed that the Orlando Laboratory independently found out the formula of D.D.T.

D.D.T. is a poison to the flea, fly, louse, mosquito, bed-bug and the cockroach. The last two are the worst nuisance in a household. The rest are the causes of the main epidemics of the World specially the tropical countries. Malaria, yellow fever, dengue and filariasis cannot thrive without mosquitoes. Typhus and relapsing fever would vanish with lice. Trypanosomiasis would go with tsetse flies and bubonic plague with the rat flea. With the disappearance of the common house fly the insect transmission of dysentery, typhoid fever, cholera would be eliminated. D.D.T. is a slow killer. It is seldom lethal before fifteen minutes and may even take several hours because D.D.T. operates on the nervous system. It acts by contact and ingestion and this action is a slow process. A combination of D.D.T. and pyrethrum overcomes this deficiency because the latter has a quick paralysing action. D.D.T. has three outstanding properties in comparison to other insecticides. Firstly, it kills more varieties of insects than others. Secondly, its rate of kill is almost maximum, and thirdly, its lasting power is protracted.

D.D.T. is ineffective against centipedes, spiders, ticks and mites. It is not an ovicide. It is a poison to birds, snakes, frogs and fish. To save fishes, D.D.T. should not be indiscriminately used. In agriculture also it may destroy useful insects responsible for pollination. Generally it is toxic to all warm-blooded animals and fatally toxic to many important forms of lower animal life. But it is safe for external use on human body in powdered preparation.[1] In oily solution it has been shown to be absorbed by the skin of experimental animals and in considerable amount produces violent tremors and loss of appetite. Wigglesworth[2] reported a case of human intoxication where the main symptoms were: heaviness and aching of limbs, sleeplessness, spasms, extreme nervous tension, prostration, and involuntary muscular twitching over the whole body on at least three occasions. Case[3] exposed two male subjects for 48 hours under special conditions (oily surface, large skin areas exposed, high ambient temperature, and relative humidity) and was able to produce toxic effects. He concludes that this does not form the basis of any condemnation of the widespread use of D.D.T., if proper precautions are taken but emphasises that D.D.T. intoxication in human beings is a hazard to be considered and guarded against. Hill and Robinson[4] reported a case of fatal poisoning in a child who drank one ounce of 5 per cent D.D.T. in kerosene. The child became comatose and had convulsions. In a discussion on D.D.T., held in the Section of Experimental Medicine of the Royal Society of Medicine[5] on December 11, 1945, Prof. Cameron gave his observations of experiments made with 58 soldiers, who volunteered to wear undergarments heavily impregnated—1 per cent weight for weight, with D.D.T. He concluded that contact with D.D.T. in the form of a slightly moistened powder need give rise to no concern. In wound surface of animals there appeared to be no difference in the healing of those who had been covered with the powder or those which had not. In man no ill effects were to be apprehended with D.D.T. powders or sprays when the substance was used in low concentration (not above 1 per cent).

During last World War II D.D.T. has been successfully used against epidemics of typhus, malaria and plague. Late in 1943, during a threatened typhus epidemic in Naples, D.D.T. first made its appearance. It was expected that typhus would claim 500 new victims a day. D.D.T. was dusted up the trousers, legs and sleeves and down the collars of some 3,00,000 Neapolitans. In two months there was no more typhus in that city. Against malaria D.D.T. has been used in various ways and in many places. It has been sprayed from aeroplanes, and even used in bombs. It was used in May, 1944 in Arkansas, the centre of a rice growing area in the middle western United States. In five months the anophelene mosquito population averaged 309 per building per day outside the sprayed area and

---

[1] Ferguson, Donita—The War to Save Lives. Issued by *The United States Information Service.*

[2] Wigglesworth, V. B.—*Brit. M. J.*, **1**:517, 1945.

[3] Case, R. A. M.—*Ibid.*, **2**:842, 1945.

[4] Hill, K. R. and Robinson, G.—*Ibid*, **2**:845, 1945.

[5] *Brit. M. J.*—**2**:933, 1945.

only 3 to a building per day within the sprayed area. It was also successfully used against mosquitoes in Panama, Saipan, Po Valley and Burma. Sprayed in advance of troop movements, the new insecticide reduced the malaria incidence in the British Burma Army by 95 per cent to 100 per cent. An outbreak of plague in Algiers was also dealt successfully by D.D.T. in 1944.

It may be pointed out here that typhus, plague and malaria are the worst killers in India. Every year thousands of lives are lost by plague and malaria. For the last century and a half, no effective steps have been taken by the Public Health Departments to check the above evils. Great controversy is going on in this country for medicines to cure malaria, which many inhabitants of our country cannot afford to buy. It may be mentioned in passing that the incidence of malaria in the province of Bengal alone is between 30 to 40 million cases per year out of a total population of 51 million. D.D.T. seems to be a quick remedy to reduce this incidence at once. No excuse of expenses can stand in the way because there is no reason why D.D.T. should not be manufactured in our country on a large scale by local manufacturers. If necessary the State should lend its helping hand to such an endeavour. Malaria is India's enemy No. 1. Eradication of this curse from India should be the first and foremost duty in any future national health planning.

(*Continued from page 278*)

Paroxysmal Tachycardia in Children

Neubauer (*Brit, Heart. J.*, **7**:107, 1945) writes that during 1941-45 he observed eleven cases, all confirmed by electrocardiograms, in an infectious diseases hospital; three of the patients were under a year old, the ages of the reminder ranging from 6-8 years. In seven cases the tachycardia was associated with diphtheria, in two with meningitis, in one with pertussis, and in the eleventh case, an infant of 5 months, no focus of infection could be found. The case mortality was heavy nine of the eleven cases ending fatally, but death could usually be attributed to the severity of the infection and not to the tachycardia. In most cases the tachycardia was supraventricular in origin, but in some of these it is possible that the arrhythmia was really paroxysmal auricular flutter. Ventricular paroxysmal tachycardia was recorded on three occasions. The clinical manifestations were imperceptible pulse, a low blood-pressure, vomiting, cyanosis, increased area of cardiac dullness, albuminuria, pallor, apathy, enlargement of the liver, syncope, pulmonary rales, and restlessness. In infants the differential diagnosis from pæumonia is sometimes difficult, and Neubauer suggests that in a young infant a heart-rate exceeding 190-200 per minute should always arouse suspicious of a paroxysmal tachycardia.

Neubauer found that pressure on the carotid sinus or on the eyeball had little effect on the course of the paroxysm. In many mild cases the tachycardia ceases spontaneously. On general principle there seem to be good reasons for using an acetylcholine derivative, such as mecholyl, in the cases of supraventricular origin, while in those arising in the ventricles quinidine would be the drug of choice. Cases of paroxysmal auricular flutter, on the other hand, would be better treated, in the first place at least, with digitalis.

It is possible that paroxysmal tachycardia is responsible for some of the sudden unexplained deaths in infancy or childhood. In three of the cases in Neubauer's series a necropsy was performed and in none could any adequate cases of death be found.

(*Continued from page 283*)

men have played the most conspicuous rôle. Even before the Drugs Inquiry Committee, Dr. Sundari Mohan Das, Dr. K. S. Ray, Col. Stewart and Col. Chopra tried their best to improve the pharmaceutical training in the State Medical Faculty of Bengal. In 1936, Dr. Ankelsaria, a medical man of Ahmedabad, gave Rs. 2,00,000 for the establishment of a College of Pharmacy in Bengal. The Bengal Government appointed a committee for the purpose, and this committee, in which medical men like Col. Chopra, Dr. B. C. Roy and late Sir U. N. Brahmachari served, was the first to draft a Provincial Pharmacy Bill. Later, a more comprehensive Bill was drafted by the Indian Pharmaceutical Association in 1941 and as this was more or less an acceptable draft, the Indian Medical Association, not wishing to duplicate effort, endorsed it.

The present Bill in the Central Assembly differs significantly from the Bill drawn up by the I.P.A. and therefore the I.M.A. thought it worth while to point out these departures.

The medical profession would have certainly succeeded in improving the pharmaceutical education and service in this country had they received positive help from the pharmacists. The latter have never been able to develop a proper organization. This is seen from the fact that all pharmaceutical organizations have either a medical man or a chemist as their president.

Why this unseemly haste to get an improperly drafted Pharmacy Bill through the Assembly, within one month of its formal introduction? One can easily explain the anxiety of the "compounders" to have this Bill through, because then they would automatically get the status of "pharmacists" along with the degree-holders in the subject. Mr. Acharya quoted British law on the subject. If he likes the British law, he should not expect all "compounders" to be enlisted in the same group as the "pharmaceutical chemists." Why does he not fight for the creation of two statutory registers instead of one, as is being insisted upon in the present Bill?—Yours, etc., B. B. Roy, M.B. Calcutta, 25-3-46.—*Statesman dated 29-3-46.*

CURRENT MEDICAL LITERATURE

Atabrine and Nervous System

Vollmer and Liebig (*Deutsche med. Wochenschr.*, **70**: 413, 1944 Ref. *J.A.M.A.*, **128**:982, 1945) write that experiments on rabbits and cats revealed certain secondary effects on the central nervous system of these animals. Psychosis and motor excitement were caused by suicidal attempts with large doses of atabrine (1·9 to 9 gm.). The authors report 4 recurrent cases of tertian malaria in which secondary effects on the central nervous system were observed. The occurrence of these reactions was in contrast to the opinion of other authors, who believed that reactions of this type do not result from the administration of thereapeutic doses of the drug. The incidence (4 in 450 cases) was low. Psychosis resulted in 3 cases from intramuscular injection of atabrine, and psychosis associated with bulbar paralysis and flaccid paralysis of the lower extremities in 1 case. The aforementioned disturbances were of short duration. There were no irreversible cases.

Penicillin in Cutaneous Disease

Frank and others (*Arch. Dermat. & Syph.*, **52**:14, 1945, Ref. *J.A.M.A.*, **128**:575, 1945) used the sodium salt of penicillin in a solution that contained from 400 to 600 Oxford units per cubic centimeter. This was applied to the affected areas as a wet dressing, so that the lesions were constantly dampened with the penicillin solution. To prevent the solution from evaporating rapidly, the saturated gauze was covered with oilcloth. For the intramuscular injections, 20,000 units of penicillin was mixed with 2 c.c. of isotonic solution of sodium chloride. Penicillin was useful in the treatment of sycosis vulgaris, impetigo contagiosa and gonorrheal conjunctivitis when used locally. Whether penicillin was used intramuscularly or intravenously, it proved to be beneficial for sycosis vulgaris, pustular acne, Ludwig's angina and chronic cutaneous diseases complicated by secondary infection with pyogenic organisms. Penicillin therapy was of no value in psoriasis vulgaris, lichen planus, favus, lupus erythematosus, pemphigus foliaceus, and seborrhœic and chronic fungous dermatitis.

Sulphonamide Treatment

One of the most useful of the M.R.C. War Memoranda is that entitled "The Medical Use of Sulphonamides": since its first issue in 1943 over 50,000 copies have been sold. A second edition has now appeared, to which considerable additions have been made. These are concerned not only with new sulphonamide compounds and with recent experience in the use of these drugs generally, but with the profound change in the chemotherapeutic situation which has been wrought by penicillin. Although the therapeutic use of penicillin is not within the scope of this monograph it was a subject which clearly could not be ignored, since the sulphonamides and penicillin are alternative treatments for many conditions, and the latter is often much the more effective. On the other hand, in the present state of availability of penicillin dogmatic assertion that it should be used, without mention of any alternative, would unfortunately not always be helpful. These difficulties have been met both by insertions in the text dealing with the individual treatment of many conditions and by a new section on the relation of the main subject to penicillin therapy; in this the spheres of the two forms of treatment are outlined, and in the wide domain where these overlap their respective merits are discussed. The strongest injunctions to use penicillin if possible are naturally given in connection with severe staphylococcal infections of all kinds, most forms of purulent meningitis, and gas gangrene, acknowledgment of its superiority to the sulphonamides is made in the treatment of wound infections, diseases and injuries of the eye, anthrax, bacterial endocarditis, gonorrhœa, and Vincent's infection, but instructions for the sulphonamide treatment of most of these conditions are nevertheless given. This is the only possible attitude to take at present, but it will be interesting to see how therapeutic policy will develop when penicillin becomes freely available. That penicillin will entirely supplant all other forms of treatment for gonorrhœa seems certain. Apart from the other conditions named it may well come to be regarded as the ideal treatment for most forms of pneumonia, and as Helmholz and Sung have pointed out, its concentration in the urinary infections due to some of the more resistant bacteria may be controllable. These and other possible spheres of penicillin treatment remain to be explored further.

The title of this memorandum is too modest: it deals not only with medical conditions in the narrower sense of the word, but also with surgical. The section on wound treatment is particularly thorough, although no attempt is made to pass judgment on the now disputed value of sulphonamide powder treatment as preventive of wound infection. Several alternatives are offered, including proflavine sulphathiazole powder to which might have been added similar preparations of flavazole, a new compound the properties of which have recently have described by McIntosh and others (*Lancet*, **2**:97, 1945)—a microcrystalline suspension of sulphathiazole, and marfanil. This last is one of the three principal new sulphonamides of which mention is made; it is suitable only for local application, peculiarly active against the organisms causing gas gangrene, and not inhibited by *p*-aminobenzoic acid or by pus. A mixture of marfanil (4-aminomethylbenzenesulphonamide and sulphanilamide was extensively used by the Germans as a wound prophylactic. General instructions, condensed from other publications, including M.R.C. War Memorandum No. 2, are given for the treatment of gas gangrene, and the section on burns follows the lines developed in the Burns Unit, Royal Infirmary, Glasgow. The two other sulphonamide drugs described for the first time are sulphamerazine and phthalylsulphathiazole, the latter being the latest addition to those drugs which remain largely unabsorbed and exert an action in the lower bowel. Among other additions is an interesting discussion on the value of group prophylaxis *i.e.* the large-scale administration of small doses as a purely preventive measure in the presence of an epidemic. This measure has been used effectively against bacillary dysentery and streptococcal infections of the upper air passages; a short course will also eliminate meningococcus carriers, and a very prolonged course has been found to prevent relapses of rheumatic fever. The problem of sensitization to sulphonamides is also discussed with emphasis on the peculiar liability to this of patients treated by applications to the skin. New proceedings are also described in the section on laboratory methods. A limited number of selected references is given in the text to recent papers or those dealing with matters on which the reader may wish to inform himself more fully. This memorandum remains a model of condensation as the average book of many times its size, and possesses far more authority. It will doubtless remain the standard guide to its subject.—*Brit. M. J.*, **2**:465, 1945.

Epigastric and Appendicular Syndromes in Amoebic Colitis

Simonetti (*Boll. Soc. Ital. di Med. Hygiene Trop.*, **4**:685, 1944. Ref. *Trop. Dis. Bull.*, **42**:809, 1945) writes that dyspeptic symptoms associated with gastro-duodenal disturbances are common in patients with amoebic colitis; these vary in degree between the "purely functional" and the "frankly organic"; some are a mingling of the two. Among 2,400 whites (Italians?) examined on account of digestive disorders at the Asmara Hospital in 3 years 4 months to August 1944, there were 355 (15 per cent.) with duodenal ulcer and 101 (4 per cent.) with gastric ulcer; 315 (13 per cent.) had amoebic colitis. Seventy-eight (all males) had amœbic colitis and duodenal ulcer, and twenty-one (19 males, 2 females) had the ambœic colitis with gastric ulcer. Among 200 natives atttending the hospital for the same causes during the same period, 35 had a duodenal and 5 a gastric ulcer and 75 had amœbic colitis; 9 (all males) had duodenal ulcer and colitis and there were no cases of gastric ulcer and the amœbic colitis.

Next, appendicitis, or an appendicular syndrome—pain in the right iliac fossa with colic—is common in amœbic cæcitis and colitis. Of the 2·400 Europeans examined, 318 (161 males, 157 females) had appendicitis; 45 males and 25 females had appendicitis and amœbic colitis. That is, 28 per cent, of the males with chronic appendicitis had amœbic colitis also, and 16 per cent, of 157 females. As regards the indigenous population attending the hospital, 10 out of 67 males with amœbic colitis suffered also from appendicitis, and 3 out of 8 women. Further, 10 of those with chronic appendicitis, 26 in number, were passing *Entamœba histolytica* in their fæces. Of course, in some cases of acute appendicitis the form was the usual and might have no connection at all with the amœbic colitis, nor is it possible to say (in cases where operation was not performed) whether the chronic appendicitis was due to the *Entamœba* or to the more usual causes. We can only say that chronic amœbiasis and chronic appendicitis may simulate each other and cannot always be differentiated (and may, of course co-exist) The concomitant incidence of the gastric and duodenal ulceration, and of appendicitis with amœbic colitis, is so high that it is more than likely that the conditions may be ætiologically connected. This aspect of the question is to be dealt with in another paper.

Use of the New Insecticide DDT in Relation to Problems of Tropical Medicine

Buxton (*Trans. Roy. Soc. Trop. Med. & Hyeg.* **38**:367, 1945, Ref. *Trop. Dis. Bull.*, **42**:835, 1945) writes that the ideal insecticide, in addition to being highly toxic to insects, should be safe to man and mammals, and stable under natural conditions; it should not stain, have an offensive smell or harmful effect on fabrics, metal etc.; it should be easily manufactured at low cost, and be adaptable to many methods or purposes. DDT dichlor-diphenyl-trichlorethane, fulfils these requirements more nearly than any other substance. It is an exceedingly non-volatile, white crystalline powder, with a faint pleasant smell. It melts at 108°C; the molecular weight is 354·5, the density 1·6 gramme per ml.; and it dissolves in most organic solvents, though the solubility in water is very low. In mineral oils it tends to be more soluble in the less highly refined specimens, the solubility in kerosene being 4 per cent, that in various fuel oils 8 to 10 per cent. Commercial samples are usually mixed with other substances, mostly isomers which are only slightly insectidal, and have a purity of 60 to 70 per cent.

Solid DDT ground with a mineral diluent is harmless when applied to the skin, and does not retard the healing of cuts. When applied to the skin in solution, DDT is absorbed, and symptoms occur in experimental animals after daily application of 150 —1,200 mgm. per kgm. Dimethyl and bibutyl phthallates do not increase the absorption of DDT in comparison with other solvents. There are no records of dermatitis after DDT, and sensitization is uncommon. It is not harmful to the eye, including the conjunctiva, and ointments up to 5 per cent. have been put on the conjunctiva without ill-effect.

When experimental animals and men are exposed to concentrated mists of DDT solution, and dusts of the powder they do not suffer ill effects, and no danger is to be expected following inhalation of sprays or dust during insecticidal work. However, precautions should be taken to prevent the heavy contamination of food.

When single doses of oil solutions are given to experimental animals by the mouth, the median lethal dose varies from 150 to 600 mgm. per kgm., and continuous dosage with 50 mgm. per kgm. per day is fatal to rabbits. Symptoms are slow in onset, initiated by abnormal excitability and tremors, going on to flaccid paralysis and death. (For an account of symptoms in man see Wigglesworth, *Bulletin of Hygiene*, **20**:411, 1945). At post-mortem examination in animals exposed to toxic doses of DDT minor nervous changes are seen, with large areas of necrosis in the liver. The author concludes that DDT used as an insecticide is quite safe.

DDT is more general and less specific in its action on arthropods than most insecticides, but the lethal dose for different insects varies greatly, that for *Rhodmius*, for instance, being 10,000 times that for *Aedes*. It acts as a contact poison, and has a very slow effect, death being preceded by in-ordinated and violent movements. It is not repellent to insects and is not a fungicide.

Against flies and mosquitoes it may be used as a spray, most such sprays now consisting of DDT to kill the insect with some pyrethrum to ensure quick knockdown, or as a film on surfaces. Films for which a dose of 100 mgm. per sq. ft. should be aimed at, hold the number of mosquitoes in treated rooms down to a very low figure for 2 or 3 months after a single application. Much entomological work is necessary on this subject, as the probability of killing is influenced by the habits of the mosquito, and the type of place in which it rests. A particularly important point is that the use of such films may solve the problem of transport of insects by aircraft. Field tests of the dry powder as a larvicide have been disappointing, despite encouraging laboratory results, but 5 per cent. oil solutions have proved effective in doses of 1 to 2 quarts per acre, and under experimental conditions in doses as low as 0·1 c.c. per square yard (0·85 pints per acre), which gives some residual effect needing further enquiry, as does the use of colloidal solutions. Distribution of oil solutions by aircraft not only kills larvae, but also many adult mosquitoes contaminated either directly or by picking up DDT from surfaces at night.

Adults house flies may also be killed by sprays or films, the recommended strength of sprays being 0·3 or 0·5 per cent., with 0·05 or 0·03 per cent. pyrethrins, respectively, Films of 25 mgm. per square foot are effective, though the dose varies with the nature of the wall surface, painted surfaces needing more than plain wood, and glass surfaces very minute quantities.

It has also been shown that many other muscids, including *Calliphora, Lucilia, Chrysomyia, Stomoxys* and *Glossina* are very susceptible to DDT in the form of a residual film, and very promising results, in their control have been obtained. DDT has also been used in emulsion against the larvae of the housefly with success.

As an insecticide against lice, DDT is very valuable, and a 10 per cent. mixture with talc is now commonly used; it remains effective for 2 or 3 weeks, and may kill lice after that assuming that the subject does not wash his garments. For men in winter clothes, 1½ ounces per treatment suffices. It was used in the control of typhus in Naples early in 1944 on a very large scale, and this has been described as "the only completely proven victory which can as yet be ascribed on DDT's battle honours." An even more effective method is by impregnating garments with 1 to 2 per cent. of DDT from solutions or emulsions.

DDT has also been used against head lice as a dust, or in emulsions, in which form 0·2 gm. completely proofs the head for a week.

DDT is without doubt the most effective material known for bug control. Experimentally, films of about 0·2 mgm. per square cm. (180 mgm. per square foot) remained lethal for from one to six months. The type of surface and the method of application affect results and dosage. In practical trials, it has been found that a dose of about 100 mgm. per square foot kills many bugs brought in within three months.

Cockroaches are relatively resistant to DDT. A five per cent. powder is very effective against fleas. Trombiculid mites die after running on impregnated garments, but as the effect is slow and wears out with washing, this method is of little value against the vector of scrub typhus. There has been recorded, however, a marked reduction in mites on ground dusted with 30 lb. of 2 per cent. DD per acre.

Pathology of Rheumatic Fever

Mckeown (*Uulster M. J.* **14**:97, 1945) writes that this morphological study of eighteen cases of acute and eighteen cases of healed rheumatic fever indicate that the lesions of this disease are more widespread than is generally appreciated.

In the heart, the specific lesion, the Aschoff nodule occurs in the paravascular, interstitial, valvular, and subendocardial tissues. It has been shown to undergo a remarkably constant evolution, beginning as a necrotic lesion of the fibrous tissue, it is soon manifested by an acute non-specific inflammatory infiltration, which in turn gives way to the focal aggregation of a rather peculiar form of histiocyte—the Aschoff cell. These cells appear to undergo an evolution into fibroblasts with the production of collagen, the process eventually terminating in the formation of a fibrillar scar, the only characteristic of which is its site.

Accompanying this specific lesion is an arterial damage which, though consisting of a non-specific fibrinoid necrosis and associated inflammatory infiltration, is remakably constant. The vascular lesion is usually, but not always, confined to the coronary system. In the present analysis it has been encountered in the lungs, spleen, aorta, and kidneys.

The changes in the valve are of predominant imoprtance. In this study it has been revealed that the formation of vegetations is a more complex process that is generally appreciated. Necrotic foci of collagen may by reason of the associated œdema and swelling, project from the surface of the valve, and with the subsequent loss of covering endocardium became coated with platelets and film of fibrin. A similar end result may develop upon an immediately subendocardial Aschoff nodule. The development of macroscopic verrucae is, however, partly dictated by mechanical factors, and it is these which appear to be of importance in the determination of the common site of these lesions on the lines of valvular closer.

The frequent implication of the aorta in the rheumatic process was of interest, for it strengthened our evidence in favour of the conception that rheumatic fever is essentially a disease of the whole vascular system. Of further importance in this connection was the occurence of pulmonary arterial lesions and occasional involvement of the splenic and renal vascular system.

It is generally believed in rheumatic fever that the heart is the site of maximum damage but from these observations it is suggested that all tissues of mesenchymal origin, especially the vascular mesenchyme, are liable to be involved, and no matter where the rheumatic lesion occurs, and no matter what ætiological agent is responsibile for its production, the nature of the tissue damage is fundamentally the same, the process being constant in its histological appearance, showing modification in different sites, dictated by the essential structure of the tissue involved.

Prognostic Value of Marrow Eosinophiles in Thrombocytopoenic Purpura

Schwartz (*Am. J. M. Sc.*, **209**:579, 1945) writes that thirty cases of the primary type of thrombocytopenic purpura were studied on the basis of the bone marrow eosinophile counts. It was found that these cases could be divided into two groups, one of which showed an increased number of eosinophiles in the marrow. In cases with the high eosinophile count, the prognosis was excellent for complete hæmatologic and clinical recovery and splenectomy was unnecessary. No, correlation between the blood and marrow eosinophile counts was noted. It is suggested that the high marrow count is a manifestation of an allergic state of which the thrombopenia is merely a symptom, Bacteria, foods and drugs may be the offending agents. With a low marrow eosniophile count, splenectomy is necessary. It is believed that the thrombopenia is precipitated in allergic individual by the action of a trigger mechanism and that the clinical symptoms represent a "summation" effect.

Gastric Acidity and Occult Blood Studies in Duodenal Ulcer

Page (*Rev. Gastroenterol*, **12**:343, 1945) writes that two hundred forty-six patients in a gastroenterology ward were studied as to gastric acids and stools for occult blood. One hundred thirty-seven patients had duodenal ulcer and 109 had no lesion of the upper gastrointestinal tract.

The acidity of free fasting hydrochloric acid was not significantly different in the duodenal ulcer and non-ulcer groups. The degree of acidity of free hydrochloric acid after a fractional alcohol test meal was not consistently different in the two groups. No patient with duodenal ulcer had a consistent anacidity while 5·5 per cent of the patients in the non-ulcer group had a constant anacidity after histamine. Positive stool examinations for occult blood were not significantly different in the ulcer and non-ulcer group. Gastric analyses employing the fractional alcohol test meal and stool occult blood studies were of no material aid in substantiating the diagnosis of duodenal ulcer in a group of young adult male patients.

(*Continued at page 275, col. 1*)

NOTES AND NEWS

PHARMACY BILL IN THE CENTRAL ASSEMBLY

The following is the speech of Dr. G. V. Deshmukh (Bombay City, Non-Muhammadan Urban) delivered in the Central Assembly.

Sir, I move that the Bill be circulated for the purpose of eliciting opinion thereon by Tuesday, the 30th April, 1946. Let not my amendment be construed in the light that I want to delay this kind of legislation. I do not want to delay this kind of legislation but I want to improve and better it. If I explain to you how I look at this bill, you will see the difference between my aims and objects and the motive with which this Bill has been brought forward. His idea of the profession of pharmacy seems to me to be only this—if you can supply a better type of compounders and a better type of those persons who can mix medicines, that is all that is wanted for the purpose of pharmacy. My idea of pharmacy is very different. I think pharmacy, in other words dispensing of drugs, in other words purity of drugs, in other words the production of drugs, in other words, health, I may go further and say, the health of the nation—all these are inter-connected subjects and therefore merely to come forward before the people's representatives and tell them that you are doing something terribly important in the interests of the public and put forward a Bill like this is worse than useless. If this Bill is taken in its isolated form I personally would not have paid attention to it but looking at this Bill as the first very delayed and very weak measure to open on our health front in the war against disease and death, I am willing to take interest in this. Unfortunately this is a subject with which this House is not very conversant and therefore in order to give my colleagues and friends a better idea of the Bill, I propose to deal with this unfamiliar subject to this House in the light of what is the background, what is the importance of the subject, how other countries have solved it and what are the things that we should do about it.

To begin with, see how this so-called profession of pharmacy can be looked at from the higher point of view and from the real point of view. Let me draw the attention of the Honourable Members to the Legislation of Pharmacy in Great Britain itself. This subject is not new. I would say that similar and better legislation should have been undertaken by this Government long time ago. As early as 1852 a similar Bill, an Act of Pharmacy, was passed in Great Britain. Therefore there is absolutely no justification for the Government here to come and say that this is a new measure and that they know nothing about it. What were the aims and objects of that Bill in Great Britain as early as 1852? The object of that Pharmacy Bill was safety of the public, not merely providing competent compounders to the medical practitioners and not only a knowledge of mixing of medicines but also a competent knowledge of pharmaceutical chemistry was necessary. That is the idea behind Pharmacy Bills. If you want to have competent pharmacists, then they must not only mix medicine but they should have pharmaceutical knowledge. In other words, they ought to know production and purity of manufacture of drugs side by side with that, they should keep the ideal of the health of the people before them. Compare with that the aims and objects of the Bill which has been brought forward now. It is stated here "It is desirable that as in most other countries, only persons who have attained a minimum standard of professional education should be permitted, etc."

See the difference in the aims and objects of the legislation in Great Britain and legislation proposed here, even in non-controversial matters like the health of this country. The aim here is the minimum standard of professional education. After all this Bill is being brought forward for the sake of the health of the country and you are going to be satisfied with a minimum standard of professional education.

Sir, this reminds me of a very similar measure that I took considerable part in, namely, the All-India Medical Council Bill. There, again, what did you have? A minimum standard of professional qualifications. And here you will be satisfied with the minimum standard. That means you will put up with inefficiency. That means you do not want anything first-rate here. All that you want is some excuse that we are in India and that we are doing all that we can for the public. My object in supporting a measure like this is not this. I will not be satisfied with the minimum standards. I want the very best that I can have in the whole world provided I can afford it. And I know that I can afford it. In fact, I can afford much more than Great Britain can at the present time. I belong to a creditor country and not a debtor country and, as such, why should I not expect the best of things in health and otherwise for my people. What is the other aim and object? Whereas the aim and object in Great Britain is competent public health and competent pharmaceutical knowledge, what is the aim here? It is interesting. They say: "It is further proposed to empower Provincial Governments to prohibit the dispensing of medicine on the prescription of a medical practitioner otherwise than by, or under the direct and personal supervision, of, a registered pharmacist". Whereas there the pharmacy laws wanted a competent knowledge of pharmaceutical chemistry, which means, as I said, the manufacture of drugs, here my Government for better or for worse is satisfied in respect of a good pharmaceutical knowledge with only giving just sufficient knowledge, so that they can mix up medicines. Therefore, from this point of view I do not think that the Bill should be sent straightaway to the Select Committee and that there is nothing more that we can learn from the public opinion.

At the present time the opinion in the country and certainly in my profession is that we are all out to do the best we can for the preservation of health and for the welfare of our country. What is the condition of health in India? Let me give you some figures from the Health Section of the League of Nations and they will stagger you. It is astonishing how much apathy there is in my own countrymen with regard to the public health in this country.

Sir, a few millions are killed and maimed in a war, whether it is the first world war or the second Global World War, and not only Europe but Asia and also our country are in a great excitement of the terrible calamities that have happened and of the great mortality that has occurred. And although from day to day men are dying from very common diseases in this country, yet we do not seem to pay any attention to it. Take, for instance, malaria only. The figures that I am going to give are not my figures; I have got them from the Health Section of the League of Nations. Does anybody know what is the mortality from malaria in India? It is a million and a half. Fifteen lakhs of people die from malaria every year. Then, take the figures of those corresponding to the injured on the battle-field. I mean those who

are afflicted with malaria but do not die and whom you could compare with the injured on the battle-field. Their number is not less than 100 million per year. That is the figure which you can attribute to one disease, malaria, only.

Two years ago when I came here on the food question, I said that food famine was a man-made famine. Many people in the country criticised me for having said that and they said that I had coined a new word. I still believe that the famine then was a man-made famine. I did not take part in the food debate, but I still believe that instead of procurement, distribution, control, rationing and all that in the last five years, if the Government or the Food Department had gone about its business properly, that is, for the proper production of food, proper fertilizers, proper utilisation of water supply in this country, then we would not have had the occasion to go about whining to other people and asking them to give us more food. By this time, as is the case with the nations of Europe, we could have easily increased our food supply by ten-fold and to-day we would not have been in the helpless position in which we find ourselves. This is only by way of example. Also, in the case of medicines and drugs we have a similar man-made epidemic and man-made death-rate and I make bold to say that it is so. Why do I say so? The yearly death rate of a million and half per year and 100 million maimed per year can be prevented by human effort. According to the same Health section of the League of Nations, what were the requirements of India with regard to quinine? Four million lbs. And what was the actual consumption in India of quinine for protection against malaria? Sir, I do not think you will believe it and I can be corrected if I am wrong, it is 20,000 lbs. ,

Mr. S. H. Y. Oulsnam—It is 200,000 lbs.

Dr. G. V. Deshmukh—I am glad I have been corrected and I will take his figure. Even if he increases it ten-fold, he cannot give us four million lbs., which is the amount required. I blame Government for that and I do not exclude the public from the blame. All that the Government and the public institutions of the country were doing was to supply them with 200,000 lbs. of quinine. Is that a very satisfactory state of things for the Government? Instead of 200,000 lbs. suppose four million lbs. of quinine had been supplied, is it not possible that you could have prevented this death-rate? A few millions are maimed in a war which happens once in two generations, but this is happening day after day and people are taken away from this country. You had a famine once in Bengal, a terrible famine, a famine for which everybody did feel at that time, but I am surprised at the apathy and indifference with which this process has been going on with us. We look at it with sheer indifference. There, again, I am ashamed, not for myself, but for this Government that, when quinine was not available, was it not possible to prevent the death-rate by malaria? There is such a thing as atabrin which has been found useful and a good substitute for quinine. The price of quinine in ordinary pre-war days was Rs. 18 per lb. At the present time the price of quinine is Rs. 500 per lb. But what is the price of atabrin? It is only four shillings per lb. or Rs. 3 per lb. Now, Sir, do you know what happened with regard to this? The Director of the Haffkine Institute in Bombay sent a statement to the Government and also made a public statement that we could produce all the atabrin required in this country. Whereas quinine takes weeks to prepare and its trees take months to grow, this process could easily have been utilised and finished within a few weeks. And yet what do you think this Government did which comes forward with all these futile Bills in the interests of the health of the country? They said that no permission could be granted. One would like to know why a permission like this could not be granted. Therefore, what I do say is this. If you must have pharmacy bills, then do something that is efficient.

Do something that will help the health of the country and not only myself but the whole of my profession—I am confident to tell you will be behind you. With regard to this question, I may say that the whole thing started from the Drugs Enquiry Committee of 1930-31. That Committee went round the country, if only the instructions of that Drugs Enquiry Committee had been carried out to-day, we would never have found ourselves in the position that we are finding to-day. The position today in the case of food is expected to get worse, there will be complete famine. In the case of Drugs also, I may tell you we are very badly off. We were badly off and even now we are no better off, yet this Drugs Enquiry Committee made recommendations one of which was to start educational centres for pharmacy. That was in 1930. I see the Honourable Mover of this Motion is trying to look up the Drugs Enquiry Committee report to find out if that is or not. I will give him some more information. That information is they suggested that there should be a training centre for pharmacy and for the preparation of drugs not one only, but one in each Province. That was the recommendation of the Drugs Enquiry Committee. Yet, what do we find? The report of the Drugs Enquiry Committee has been completely forgotten. We heard something about it in 1940 in the shape of the Drugs Act. Now, we find this Pharmacy Act in the year of grace 1945.

Sri M. Anantasayanam Ayyangar—We are in 1946.

Dr. G. V. Deshmukh—I thought I might give the Government a little more credit and make it one year earlier. In 1946, in every other country you have had a Drugs Act and a Pharmacy Act. You always have the Pharmacy Act and the Drugs Act together. Look at England. It has been the same—Pharmacy and Drugs Act, Pharmacy and Chemist Act. Wherever you find the two are allied, but here in India you find Pharmacy is isolated. Why is the subject of pharmacy isolated from its natural connections with pharmaceutical chemistry, isolated from its natural connections with Botany, isolated from all its surroundings, so that we in India can merely console ourselves that the Government have given compounders to our medical profession. That is why it is to be isolated here. I say it ought not to be so. Let this Bill go to the public, then the public and my profession will tell you how this Bill can be improved and can be made more useful for the health of the public. As I say this is a regrettable story of legislation in this country. In 1930-31, we had this Drugs Enquiry Committee about which everything has been forgotten. Then, in 1940 we had this Drugs Act. Now, in 1946 we are going to have this pharmacy Act. But there is something more to which I should like to draw the attention of the House and it is this. In 1936, the Bombay Government tried to pass a Pharmacy Act. They appointed a Committee for the Pharmacy Act in 1936. What is of greater importance is they had an education sub-committee of this Bombay Government. What happened to the report of the Pharmacy Committee of the Bombay Government. It has not seen the light of the day. I want to know from the Honourable Member himself who has brought forward this pharmacy Act whether he had a look at this report of the Pharmacy Committee of the

Pharmacy Act. I want to know again from the Honourable Mover of the Motion whether he has had a look at the report of the education sub-committee of Pharmacy Act. It is no good merely coming forward, I think the day is long past when you can rob off any measure like this and say that Government are doing their best. The Government have got to do their best, and that is now, otherwise they will have something not very pleasant. If the people of the country are to believe that the Government are doing something in return for the money they take then the Government should do something decent. What is the expenditure that the Government have been spending on this? I say there is always the excuse. You may say "Oh! it is all very well for you to suggest there should be educational institutions for pharmacy in each province, there should be the Drugs Act and so on, but where is the money to come from"? I say money does come. Government takes money all right from the people. From my city of Bombay the Government are taking something like 100 crores in the shape of income tax, and about 75 to 90 lakhs in the shape of excess profits tax. When you wanted to prevent a smaller mortality on the battlefield, what was your war expenditure per day? I am not talking about Britain's war expenditure. I think the expenditure of India—I hope my honourable friend will correct me if I am wrong—was somewhere to the tune of about two crores per day. Anyway the point is this. A days expenditure which you devote to war can be easily diverted to establishment of pharmaceutical colleges or training centres, one in each Province and that would help you to erect your health from against the diseases. You can fight all diseases by setting apart one days war expenditure. Even there, you have not treated fairly the public in this country. Perhaps the Government may ask, why is it I am alluding to all these things. My idea of this Pharmacy Bill is not merely to apply the ointment to my soul that I have done something. I want a very efficacious measure, and I believe the public will certainly support if the measure is good. Why, Sir Homi Mehta gave a donation of seven lakhs to the Bombay University for the technological section. I say if the Government would only bring forward decent measure, people will not be wanting who will give donation for starting such training centres. If these centres are started all over the country, then you can have an army of pharmaceutical chemists who will be of use to you not only as I say in supplying more compounders, but who will be of great use in production of drugs and preventing drug famine in this country.

At this juncture, why have I spoken at such length on this measure? My own point of view is that it should be sent round for eliciting public opinion on this measure. Going through the various provisions of this Bill, I see the whole thing is a huge joke. You have educational regulations and examinations and everything in perfect paper order. I want to ask my honourable friend where are you going to get your students from for this examination. Where are you going to teach them? Have you got any institutions now where you can teach them this pharmacy so that you can establish a standard of examination where your professors can go and examine the students. There are neither professors nor students for teaching institutions and you have yet a paper-perfect Bill trying to establish a standard of minimum qualifications. You talk about half a dozen objects, putting down how the board of examiners is to be constituted, what are going to be your educational rules, and all that, I say that at the present stage the whole thing looks to me not only as a joke but even better than a joke. It may be Hamlet but there is no state of Denmark about it. And in the circumstances to hurry on with legislation like this and say that this is absolutely non-controversial is to show that you have got no proper idea as to what a Pharmacy Act means and that you have not paid any proper attention to whether you have got the equipment, means or the material for the examination, and so on. I will give my honourable friend some little information. I do not know if there are very many pharmacists in India either to be professor or to be examiners. I do not think there are more than about two dozen pharmacists in the province of Bombay and very likely the majority of them are in Bombay city attached to different commercial institutions. It is not likely that they will give up their lucrative jobs to become professors in your newly formed institutions at the present time. As I said about students, so far as I know, there are no students in Bombay University. I know that in 1936 the Deans of the two Medical Colleges in Bombay were asked whether they would take students for pharmaceutical chemistry; and they both honestly and rightly said that they would not because they had not got the teaching facilities. Since then the Department of Technology in Bombay did open a section. But what does that section mean? Will that section supply you with students of the type that you want? That is a post-graduate course with no better accommodation than for about ten students; and they are working on a course of advanced studies which practically is of no use for the purpose of this Bill or for the purpose of the health of this country. In the circumstances is it not better that you should start from the beginning and with first things first? Is it not better that you should give some little attention to whether you should not start your educational centres first, preferably one in each province if you can, otherwise one at the centre if you are short of men, material and finances, and then first educate your young students through competent teachers, educate them in the subject in which you want to examine them and then come forward with Bills like this asking for a proper standard? Sir, it is from that point of view that I speak and not, as I said at the beginning, with the intention of delaying legislation. No one is more anxious than myself and my friends and colleagues in the profession that we should have a decent legislation concerning health. We should also like that whatever concerns health should see the light of day as soon as possible. The entire medical profession is interested in the Bhore Committee's health report. We have been on tenter-hooks; we want to know what suggestions were made by the foreign experts that you brought out here. Why is it that the report has not yet seen the light of day? We feel that we are more earnestly interested in our health problems than these foreign experts that are brought out here and paid for the job; they go round the country, not knowing the local circumstances, suggest academical improvements and then go away blaming our country, blaming our people, abusing our teaching and abusing our institutions. We have these experts, we have committees and reports which do not see the light of day for years and years, as happened in the case of the Drug Enquiry Committee's report and other reports and then we are treated to such fatuous Bills. Sir, instead of having this kind of joke let us be earnest about it because the question involved is a very serious one. The idea seems to be that foreigners are more interested in our health problems than we ourselves are. Many things which are inaccessible to us are accessible to them. This kind of thing should not continue and I hope will

not continue. I hope my amendment will be taken in the right spirit by the Honourable Member who moved the Bill and that he will not be in a hurry to get the report by the 26th February. Even by 30th April seems to me to be too early and even the 30th June seems to be too early. When you ask for public opinion do not confine it to opinion as to how you are going to have dispensing chemists who mix from one bottle to the other. The present lot can do that quite well. My expereience of 30 years about these poor ignorant compounders who are now blamed is that they are a very conscientious lot and they are doing their duty quite well. If you want to replace them, by all means replace them by better material, an agency which will have a better aim in view, and then you will find that we are not against this legislation but we will do our best to support it.

MR. DEPUTY PRESIDENT—Amendment moved that the Bill be circulated for the purpose of eliciting opinion thereon by Tuesday, 30th April, 1946.

PHARMACY BILL

The following letters on the Pharmacy Bill published recently in the *Statesman* will be of interest to the members:-

I

Sir,—The Pharmacy Bill long overdue is now being debated in the Central Assembly. The Drugs Inquiry Commitee under the chairmanship of Col. R. N. Chopra as far back as 1931 recommended its early enactment. Since then, almost all pharmaceutical associations and public health bodies have been urging for early Central legislation.

The Government of India at last published the Bill in the Gazette of India dated December 8, 1945. Now the Indian Medical Association has been trying to get the Bill circulated. In other countries medical practitioners are not eligible even for registration as pharmacists. Circulation means undue delay and perhaps indefinite postponement.

The British Pharmacy Act of 1852 contains the following clause:

> "No person who is a member of the medical profession, or who is practising under the Right of a Degree of any University, or under a Diploma or Licence of a medical or surgical Corporate Body, shall be entitled, to be registered under this Act; and if any registered Pharmaceutical Chemist shall obtain such Diploma or Licence, his name shall not be retained on the said Register during the time that he is engaged in practice as aforesaid.

This makes it clear that while all the groups who will be most affected by the Pharmacy Bill are favouring early enactment, the people who should have nothing to do with it are opposing it.—Yours, etc., M. L. SCHROFF, President, Bengal Pharmaceutical Association. Calcutta, 11-2-46.—*Statesman dated 17-2-46.*

* * * * *

II

Sir,—I read Mr. M. L. Schroff's Letter with interest. Two points emerge, that the Pharmacy Bill is overdue, and that the Indian Medical Association *i.e.*, medical men, should have no voice in the matter.

The medical profession is quite alive to the necessity of the Bill, and always pressed for it. As Mr. Schroff himself pointed out, it was Col. Chopra, a medical man, who first brought the importance of a Pharmacy Bill to the fore.

Mr. Schroff quoted the British Pharmacy Act of 1852, which precludes medical men from being registered as pharmacists. This is no argument why medical men should not have a say in this matter. This Act has no bearing on the point he wished to stress. No medical man is anxious to be known as a pharmacist.

The Bill before the Central Assembly has for its object establishment of Pharmacy Councils at the Centre and in the Provinces, for registration of pharmacists, and regulation of their education. The medical profession is directly interested in pharmacists' training. Since pharmacists dispense the prescriptions of medical men (which include poisons) and are concerned in the manufacture of potent drugs and other preparations, it is essential that medical men should be satisfied about their training.

The draft Bill was published in the Gazette of India on Dec 8, 1945, and it was not available to most people till January this year. It was not possible considering the far-reaching effects contemplated, to study it and make suggestions before Jan. 21, when the Bill was formally introduced. Therefore the demand for circulation for only two months should not be interpreted as an attempt to oppose the Bill.—Yours, etc., B. N. GHOSH, (Prof.) Carmichael Medical College, Calcutta, 18-2-46.—*Statesman dated 23-2-46.*

* * * * *

III

Sir,—It was not fair of Mr. Schroff to have insinuated that the Indian Medical Association was causing "undue delay" or favouring "indefinite postponement" by demanding that the provisions of an important Bill, which seeks to regulate for the first time the profession of pharmacy in India by ensuring that the persons engaged in it are adequately qualified, should be carefully studied by the medical, public health and other organizations concerned.

The draft Bill was published in the Gazette of India, dated Dec. 8, 1945. The Government of India did not circulate it for eliciting the opinion of such bodies as the I.M.A. and the all-India Medical Licentiates Association before introducing it in the Assembly on Feb. 8, 1946. I understand that the Drugs Technical Advisory Board, constituted under the Drugs Act, was also not consulted.

The I.M.A. ever since its inception in 1928, has been urging upon Government to introduce legislation for the control and regulation of pharmacy in India, including proper education of people who would enter the profession. The Drugs Technical Advisory Board recommended at its first meeting on Nov. 3, 1942, mainly at the instance of the representative of the I.M.A., that the Central Government should early proceed with the drafting of such a Bill and pointed out that the British Government had enacted the Pharmacy and Medicine Act, 1941, even in the midst of war. Sir Girja Shankar Bajpai, the then Member for Education, Health and Lands, assured the Central Assembly on April 4, 1940, that legislation would soon be undertaken.

These facts will show that the I.M.A. is as keen as the Bengal Pharmaceutical Association on early legislation but keenness does not mean that the draft Bill, which the Government of India took nearly six years to produce despite Sir Girja Shankar Bajpai's assurances, must be accepted without opportunity to public bodies qualified to express an opinion.

The Pharmacy Act will be a public health measure of great importance; and the I.M.A., the principal medical organization

in India with 266 branches, and the Drugs Technical Advisory Board, a statutory body, can certainly claim that they should be consulted. The I.M.A. is neither opposing the Bill nor causing "undue delay" or "indefinite postponement." What it asked Government to do was to allow associations like itself, which have to consult a large number of their branches spread all over India, sufficient time to study the Bill.

The I.M.A. remembers how the Drugs Bill of 1940, was rushed through the Central Legislature without allowing non-official expert bodies to appear before the Select Committee. The larger the number of expert bodies that study a draft Bill the more likely it is that objectionable features will be detected. It was with this object, principally, that the I.M.A. demanded circulation of the Bill. Another reason was that some of the Bill's provisions differ fundamentally from those of a similar Bill drafted by the Indian Pharmaceutical Association in 1941.

As for Dr. Schroff's statement that "the people who should have nothing to do with it are opposing it," how can adequate training and proper qualifications of pharmacists be ensured without the co-operation of the medical profession? —Yours, etc., P. B. MUKERJI, Hony. General Secretary, Indian Medical Association. Calcutta, 19-2-46. *Statesman dated 26-2-46.*

* * * * *

IV

Sir,—Mr. Schroff was criticized by Prof. Ghose and Mr. Mukherjee, General Secretary, Indian Medical Association.

An outline of a Pharmacy Bill was already given in the Drugs Inquiry Committee's report and the Indian Pharmaceutical Association also submitted a draft Bill in 1941. The Indian Medical Association did not submit a draft Bill nor has it done anything constructive in the matter except pass resolutions that a Pharmacy Bill be introduced.

The medical group has hitherto been in charge of the training of compounders and the training so far imparted is not good.

Prof. Ghose's contention that the Bill was sent for circulation for only two months does not hold water as it will now take at least eight months before the Act emerges from the Central Legislature. It is unfortunate that matters of importance to public health are to be thus delayed.

The control of false and misleading advertisements is long overdue. Against all sense of medical ethics, some medical people still go on dispensing medicines not only for their own patients but for others also, keeping open shops, selling across the counter and selling free samples given by manufacturers.—Yours. etc., S. K. Roy. Howrah, 12-3-46.—*Statesman dated 17-3-46.*

* * * * *

V

Sir,—As a pharmacist, I have followed with interest the controversy between Prof. Schroff, a member of the Drugs Technical Advisory Board, representing the profession of pharmacy, and Prof. Ghose and Mr. Mukherjee, representing the views of the Indian Medical Association.

The recommendations of the Drugs Inquiry (Chopra) Committee published in 1931 were the first definite step for the improvement of the profession of pharmacy. The Indian Medical Association has had ample time to review these, and offer suggestions if that body was really keen on a good Pharmacy Bill. All that was done by it during the last 15 years was the passing of resolutions that a Pharmacy Bill be introduced.

The education and control of the profession of pharmacy, hitherto in the hands of medical men, is in a deplorable state. Facilities for the training of pharmacists are ridiculous in comparison with those available for medical education. Pitiable wages, absence of any status, are the result of the unfair attitude of the medical men towards these unfortunate people.

Those who know how the profession of pharmacy was organized in Britain in the middle of the 19th century will not be surprised at the present attitude of the I.M.A. Conditions in Britain are now better than the worker in an Indian establishment can easily visualize. But there are countries which are even ahead of Britain, such as the U.S.S.R. and the U.S.A. In Russia each pharmacy is an independent unit and is equipped with comfortable furniture and other amenities for workers like Burette type tables and revolving drawers which greatly increase output.

Conditions of work such as these should be our objective here in India and those who oppose reform are not our friends. —Yours, etc., K. K. ACHARJEE. *Noakhali, March—?—Statesman dated 23-3-46.*

* * * * *

VI

Sir,—The letters of Messrs. S. K. Roy and K. K. Acharya are likely to create prejudice against the medical profession's well-meaning efforts to improve the Pharmacy Bill.

The Drugs Inquiry (Chopra) Committee had the following remarks about the profession of pharmacy in India in 1930-31, and if we exclude the about 75 "qualified pharmacists" throughout India (*vide* Bhore Committee) the situation remains much the same today.

"There is no organized and self-contained profession of pharmacy in India in the sense in which it exists in other parts of the world. The profession here is represented by a set of people known as compounders whose status, functions and duties are ill-defined and improperly understood. They carry on the compounding, dispensing and selling of drugs and chemicals from day to day. They handle drugs and poisons, in many cases in ignorance of their properties and potency. They also do work as dressers and laboratory assistants in some of the hospitals and dispensaries . . . . . In some places, they pose as physicians and surgeons and acquire a position and income by no means inglorious or negligible. In respect of qualifications justifying the role they fill, they have little or none to boast of. Their standard of education is low and not much is expected of them by way of professional training."

This description will show how the "compounders" here differ from the "pharmacists" of Western countries, who are required to have a thorough knowledge of the science of pharmacy and of the manufacture and analysis of drugs. It is, therefore, the unkindest cut of all when members belonging to this class turn round and accuse the medical profession of non-ethical dealings in "selling free samples" and "in dispensing medicines on the prescriptions of other doctors."

Mr. Roy was wrong in stating that an outline of the Pharmacy Bill was included in the report of the Chopra Committee. That Committee only made recommendations but never drafted a Bill.

Against the charge that the medical profession have more or less contented themselves with passing pious resolutions for pharmacy control, I would like to point out that in almost all forward movements for pharmacy and drug reform, medical

(*Continued at foot of page 275*)

CORRESPONDENCE

The Editor is not responsible for any views expressed by contributors

THE CONSULTING PRACTICE

Sir,—With the advance in medical science consulting practice and specialist practice are coming into fashion. In olden days there used to be *Hakim & Veds,* who by their power of observation and feel of pulse used to diagnose and treat illnesses. Those systems still prevail and are responsible for healing a large mass, who still have faith in them.

Then came Doctors, who called themselves physicians and surgeons and who used to treat all medical and surgical cases, and also gynæcological with the help of *dais* and nurses under their instructions. Then surgery became a separate art and diseases were also classified as medical and surgical and in good many cases controversy often arose whether a disease was medical or surgical. With ladies coming in this profession, midwifery and gynæcology became more or less their subject. Eye, ear, nose, throat people separated themselves and then eye people separated from the rest. Venereal specialists got aside with their few diseases and tuberculosis people made a separate place for themselves and then divided in medical and surgical tuberculosis specialists. Pathologists and x-ray people left the world of treatment and confined themselves to these special subjects. Dentists became a separate class and Health people became busy with prevention only.

The general practitioner still carries on as tota-quina but is losing ground gradually and if this specialists business goes on increasing, a day will come when there will be expert for each disease and the G. P. will be left as a sorter to find out the disease and refer the case to suitable specialist. But all this cannot be helped. We are slaves of civilization and have to proceed as it directs us. When there will be no space for the general practitioner he will also specialise in some subject. Even now-a-days if the patient does not show improvement in a few days the G.P. incharge is often requested to consult some expert. When he goes to the specialist he sees him equipped with some up-to-date instruments and a clean and well furnished consulting room and feels himself small. He sees a surgeon operating in a well equipped operation theatre, or a rhinologist performing transillumination or a tuberculosis specialist performing an A.P. and develops an inferiority complex and this puts him in the habit of consulting more frequently and a vicious circle is established. With all this there are some points having a bearing on the general practitioner which the specialists should consider.

When the patient is taken to the consultant after appointing time, the latter takes a paper and pencil and notes down the name, age and address of the patient very deliberately, and then the history, some time brief, some time very exhaustive. This is followed by a brief physical examination lasting hardly for five minutes and then the consultant comes to his chair and taking a printed form begins to write the test that must be done before he can give his opinion. This includes x-ray of some part, sometimes full gastro-intestinal tract, lungs or sinuses etc., examination of blood for total and differential W.B.C., total R.B.C. and Hb percentage etc. and urine and stools also. If unfortunately the patient has developed some paralysis, he may swear that he had never suffered from syphilis and on physical examination he may have absolutely no sign of the disease yet his blood must be examined for W.R. and if negative, a provocative dose should be given and then again examined and if still negative lumbar puncture should be performed and the fluid examined for W.R. and gold test, and all this irrespective of the facts that W.R. is positive in so many non-syphilitic conditions.

These specialists are usually those gentlemen who have visited some foreign country and after coming back they totally forget that we belong to such a poor country where average income per head per day is one anna and six pies only.

Second point is that if x-ray expert and laboratory incharge are to declare the diagnosis, what is the importance of the consultant. The G.P. after all these examinations can equally well say what the patient is suffering from and leave aside the G.P. I dare say in good many cases even the laymen can say it, for example, if the x-ray plate shows infiltration which is written on the report and laboratory man says that sputum is positive anybody can say that the patient is suffering from tuberculosis.

The need is that the specialist should have a more acute sense of touch and keener eyesight than the G.P. and specially when they have mastered one subject and the patient is taken to them usually for that they should by examination be able to direct the G.P. and if at all some examinations have to be done they should be minimum. Or the specialists should have their own equipment and after charging their consultation fee they should do these tests on small charges which should suffice for the maintenance of their outfit. What is the fate of the patient who pays sixteen to fifty rupees to the consultant, hundred for x-rays and fifty for laboratory tests and still remains undignosed for his ninety-nine degrees temperature and then his tonsils are removed and teeth extracted and still he hangs on ninty-nine.

Then comes another phase of consultation, when the consultant begins to prescribe treatment and for that, I am copying out, one prescribed for a case of chronic gastro-enteritis and anaemia.

For Mrs. ABC.

Test—(1) Kahn or W.R. (2) Total W.B.C. (3) Differential W.B.C. (4) Total R.B.C. (5) Hb. percentage. (luckily or unfortunately the stools were left out).

Treatment—(1) six emetine injections, one daily, (2) eighteen injections of hepabos fort, two c.c. on alternate days, (3) eighteen injections of Cal. gluconate on alternate days, (4) 12 injections of lactoprotein, five c.c. on alternate days, (5) if blood is positive treat that.

Oral—(1) Enterovioform—one tablet t.d.s. for 12 days. (2) Anti-dysenteric bacteriophage—one ampoule four hourly three dozen in all. (3) Re

Bis. Carb.		Sig. 2 to 4 hourly as needed.
Bis. Subnit.		
Bis. Salicylas āā	gr. 7	
Sodii bic.	gr. 12	
Tr. Card Co	m. 10	
Syr. Zingiberis	m. 60	
Aqua	oz. 1	

(4) Hepabos plain. (5) Vitamin B complex. A teaspoonful of No. 4 and 5 in water one hour after food. (6) Cal.-Lact. gr. 5 tablets t.d.s.

Now leaving aside the cost of medicine and the injecting charges the consultant has absolutely forgotten that the patient is a human being and not a devouring machine. Her stomach is not a letter box nor her blood a cooley. She has sensations. Emetine injections are quite painful and liver extract

is also not painless and lactoprotein gives local and general reaction. If two injections are given daily, one day in arms and the other day in buttocks in two days the patient will be helpless in four corners. As regards oral treatment every two hours the patient must take some medicine and if he goes to sleep several doses will be left behind.

Similar treatment is often prescribed for cases diagnosed as intestinal or pulmonary tuberculosis. Honestly speaking up to this time we do not possess any medicinal treatment for tuberculosis. Then why prick the already atrophied skin and muscles of the patient twice a day and plug her mouth with oral medicines. And then some consultants are fond of prescribing a medicine which is not easily available, for example, Campolon.

Another trouble is with those consultants who are attached to hospitals and that is that they do not treat the G.P. very well. They do not care for the time and convenience of the G.P. and some times do not even behave as a professional brother should. This trouble is less with a private consultant but even some of them have kept furious watch dogs on the gate.

These points are written for favour of consideration of the senior men in the profession and not the least of insult or criticism is meant for any body. These are our own defects and we should remedy them before the public realises and criticises them. Our profession is meant for service to humanity and it is the services of our ancestors for which we enjoy our present prestige and our profession is called a noble profession. We should try to keep up to that name. I am etc.

Sadar Bazar, Delhi.
13-10-45.

PREM LALL,
Medical Practitioner,

UNAUTHORISED PRACTITIONERS OF ALLOPATHY

Sir,—Many in the medical profession must have, of late, come across a good deal of writing in important medical journals of our country about unqualified people practising allopathy and it is of imperative necessity that early steps are taken to curb this habit. It is possible that a section of interested people will misconstrue the intentions behind such steps but unbiased thinking will easily prove that rigid Government restraint to confine allopathy to the practice of duly certified men, is calculated more for the good of the sick public than for the good of the allopathic practitioners themselves.

In our country besides Allopathy, the other systems of medicine largely practised are, Ayurvedic, Unani, Siddha and Homœopathy. It will indeed be highly controversial and therefore wrong to say that one system is better than the other; but what is in fairness expected of the adherent of each system is that he shall not transgress for reasons which are obvious. Unfortunately, the situation facing the allopathic practitioners particularly in small towns and rural areas is highly disgusting.

Compounders, homœopaths, men of the Indian system of medicine and several self-styled doctors are simply taking to allopathy as easily as a duck takes to water and the innocent illiterate masses with whom our country unhappily predominates, fall easy prey to their practice. There is yet another class of practitioners who belong to none of the above groups and whom it would be fitting to call as quacks. These men thrive more by a propaganda calculated to bring allopathy into contempt amongst illiterates than by any knowledge of medicine worth the name. Such quacks in villages are held in great respect and consequently they command easy credulity. It is perhaps not necessary to explain in detail the incalculable havoc the quacks play upon sick people in their day-to-day business, for it is easy to imagine the evils their actions are productive of. Every qualified doctor in small towns and rural parts will easily say what huge number of sick people of the poor classes is driven to meet an early doom by the misguided treatment of these unauthorised medical practitioners who make unfettered use of allopathy.

The recent World War has widely demonstrated the ludicrous paucity of doctors in our country and undoubtedly the chief reason for it is that the profession after an arduous, costly and protracted study spreading over a period of half a decade does not hold out the requisite prospects of attraction. Not that there is a want of sick people in the country for the profession to prove remunerative but because of these arch enemies, *viz.*, compounders, homœopaths and a host of others taking to allopathy. Should not the Government consider it high time to launch a campaign for eradicating these evils which undermine a profession that is regarded the noblest the world-over? I am etc.

10-1-46.
Tirupattur, N.A.

E. L. RAJAGOPAL.

QUININE AND TETANUS

Sir,—On behalf of 'The Doctors' Meet'—a local body of some doctors, I have been asked to write to you for the answer of the following question through your Journal:

"Why is it that quinine alone, out of all the injections, is responsible for so many cases of tetanus?" Of late, these cases have been very frequent. Books have mentioned the complication but nowhere a satisfactory answer has been provided. I am etc.

Philkhana,
Cawnpore,
23-1-46.

K. P. MEHROTRA, M.B.B.S.

"DOCTORS DILEMMA"*

Sir,—1. Has a medical practitioner an inherent right or privilege, in virtue of his profession, of free professional visits from local or outside fellow-practitioners of his choice in case of illness in his family?

2. Whether this right or privilege is for his own person or extends to his family and near relatives as well.

3. What should be our attitude in this respect towards allied medical departments and medical subordinates?

HARBHAJAN SINGH,
21-3-46. *Secy. Amritsar Branch, I.M.A.*

MEDICINES OF INDIAN MANUFACTURE

Sir,—With the cessation of hostilities in Europe and Asia, belligerent countries in Europe and America are turning their attention to production of peace-time commodities, and export-

* The subject was discussed in a meeting of the Indian Medical Association, Amritsar branch and was decided to send it for publication for further consideration by other branches of the Indian Medical Association and an all-India decision, if necessary. I am etc.

ing them to Asiatic and non-Asiatic countries. I shall confine my remarks to medicinal products.

Already in many cases even before their goods have arrived in India, foreign manufacturers are flooding the medical men with pamphlets and advertisements of their products. Some of these medicines are prepared and manufactured in India and need not be imported—more can be manufactured here with judicious help. I appeal through you to my brother medical men that let us not fail our own country in the post-war period. We want money for development of our country and raising the standard of living of our countrymen. Let us not buy medicines from outside that can be prepared and manufactured in India.

A *standarisation laboratory* is necessary in each province of India. We, medical men of India, want to use medicines of Indian manufacture, but of required strength and purity. Manufacturers in our country should not look only to the profit side but should have their medicines always standardised. We are not going to use any Dick and Harry perparations, unless they have the stamp of standardisation.

We, medical men of India, have our faults—our inferiority complex. We often rush to use foreign medicines or patent preparations, simply because an unknown professor of an unknown part of the globe has recommended its use and vouchsafed for its efficacy. Many of us do not know that such certificates can be bought on payment of money. Of course, my remarks do not apply to those foreign houses of manufacture who have well-equipped laboratories and factories, and whose names are guarantees of the purity and standardisation of their products.

A passing mention to a growing habit amongst us, *viz., use of patent medicines,* will not be out of place. There is a tendency among us, even among our elderly and leading section, to thoughtless prescribing of foreign patent medicines. It cuts at the root of the art of prescribing and of the art of dispensing and drains money unnecessarily out of the country. It is high time that we check this habit and use only pharmacopoeial preparations, and only on rare occasions take help of very necessary patent medicines.

In this connection, I shall also like to draw the attention of our brother practitioners as well as the Government of our country that in America there exists a *Federal Trade Commission* established by the Government there which prevents

(*Continued at foot col. 2*)

OBITUARY

DR. A. T. SINHA, M.B.,

Late Dr. A. T. Sinha was born in the year 1888 at Patna. He was the second son of late Babut Sarat Kumar Sinha, Zemindar, one of the oldest Bengali residents of Patna. Dr. Sinha was educated in the T. K. Ghosh's Academy, Bankipore and Patna College and took the Degree of "Bachelor in Medicine" in the year 1915. He was appointed as an Assistant Surgeon in the Bihar Medical Service in the year 1916 and continued in service till 1921. Since then he began his private practice at Patna. He was the First Medical Officer of Sir Edward Gait Skin-Clinic, Gulzarbagh. He was Assistant Superintendent, Pasteur Institute, from 1944 till his death and was also officiating as Superintendent, Pasteur Institute for the last one month. He was also a Lecturer on Leprosy in P.W. Medical College, Patna for the last few years. He was one of the oldest members of the Patna Medical Association.

Dr. Sinha died on 2-3-46 of meningitis.

(*Continued from previous column*)

the flooding of American market with spurious patent medicines. Every manufacturer of a patent medicine has to give its formula to this office. Not only that, but any and every advertisement cannot be circulated—within 20 days they have to prove the potency or efficacy of the preparation as they advertise. If the proprietary medicine fails to prove its value, the advertisement has to be withdrawn, or the manufacturer has to pay a penalty or a fine.

I am afraid I have taxed the patience of my readers. But I honestly believe that we, doctors, have a great hand in the foreign medicine business. If we are alert, and the Government is watchful, it will be possible with proper state legislations to cut out many unnecessary and unwarranted foreign medical products, and to help in developing our own medicinal industry. I am etc.

Calcutta
28-3-46.

P. K. GHOSH, M.B., D.T.M., M.R.C.P., T.D.D.

EDITORIAL NOTICE

¶ Manuscripts for publication, books for review and correspondence relating to the editorial management should be sent to the Editor, JOURNAL OF THE INDIAN MEDICAL ASSOCIATION, 23 Hindusthan Buildings, Calcutta. Communications regarding subscriptions, reprints, etc., should be addressed to the Secretary, JOURNAL OF THE INDIAN MEDICAL ASSOCIATION, 23 Hindusthan Buildings, Calcutta.

¶ Articles are accepted for publication on condition that they are contributed *solely* to JOURNAL OF THE INDIAN MEDICAL ASSOCIATION. Manuscripts *must be typewritten* double spaced, and the *original* together with a copy should be submitted. Zinc etchings and halftones of illustrations will be supplied by the Journal when the original illustrations warrant.

¶ Bibliographies should conform to the style of the Quarterly Cumulative Index Medicus, published by the American Medical Association. This requires in order given: name of author, title of article and name of periodical, with volume, page, month—day of month in weekly—and year. In case of references from books, name of author, title of book, edition, name and address of publisher, page number and year of publication should be furnished.

¶ Authors of articles and case notes will receive twenty-five reprints free; additional reprints may be obtained at cost.

¶ JOURNAL OF THE INDIAN MEDICAL ASSOCIATION is published monthly. Annual subscription Rs. 12|- (Inland), £1 or $7 (Foreign). Postage free.

¶ Cheques, etc., should be made payable to the Secretary, JOURNAL OF THE INDIAN MEDICAL ASSOCIATION, 23, Hindusthan Buildings, Calcutta.

¶ In case of non-receipt of a particular issue of Journal, members and subscribers are requested to bring the fact to the notice of the Secretary of the JOURNAL within a week of receipt of the next issue.